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ABSTRACT

This manual focuses on the interdisciplinary approach to environmental education for grades 1 to 12 by providing curriculum models for each grade level. Models, presented in a three-column format, display relationships between concepts and ideas with an environmental focus and various subjects/disciplines. The central column (headed Environmental Focus) is made up of two sections called themes and objectives (knowledge/understandings, skills/abilities/processes, and values/attitudes). These are connected through a system of linking arrows to right/left columns housing the "related strands" of material (topics/objectives) found within individual subject areas or disciplines. In an attempt to help the user become comfortable and familiar with the model of the curriculum plan, each grade is prefaced by a case study which describes an actual school setting and teaching situation. These studies are designed to "walk through" the model and allow the user to have some practice with its format and purpose. Included in appendices are: two special case studies focusing on the work of school administrators; objectives for topics in junior high courses (industrial education, home economics, business education) and senior high courses (industrial education, home economics); general objectives for environmental education; and other, related information. (JN)

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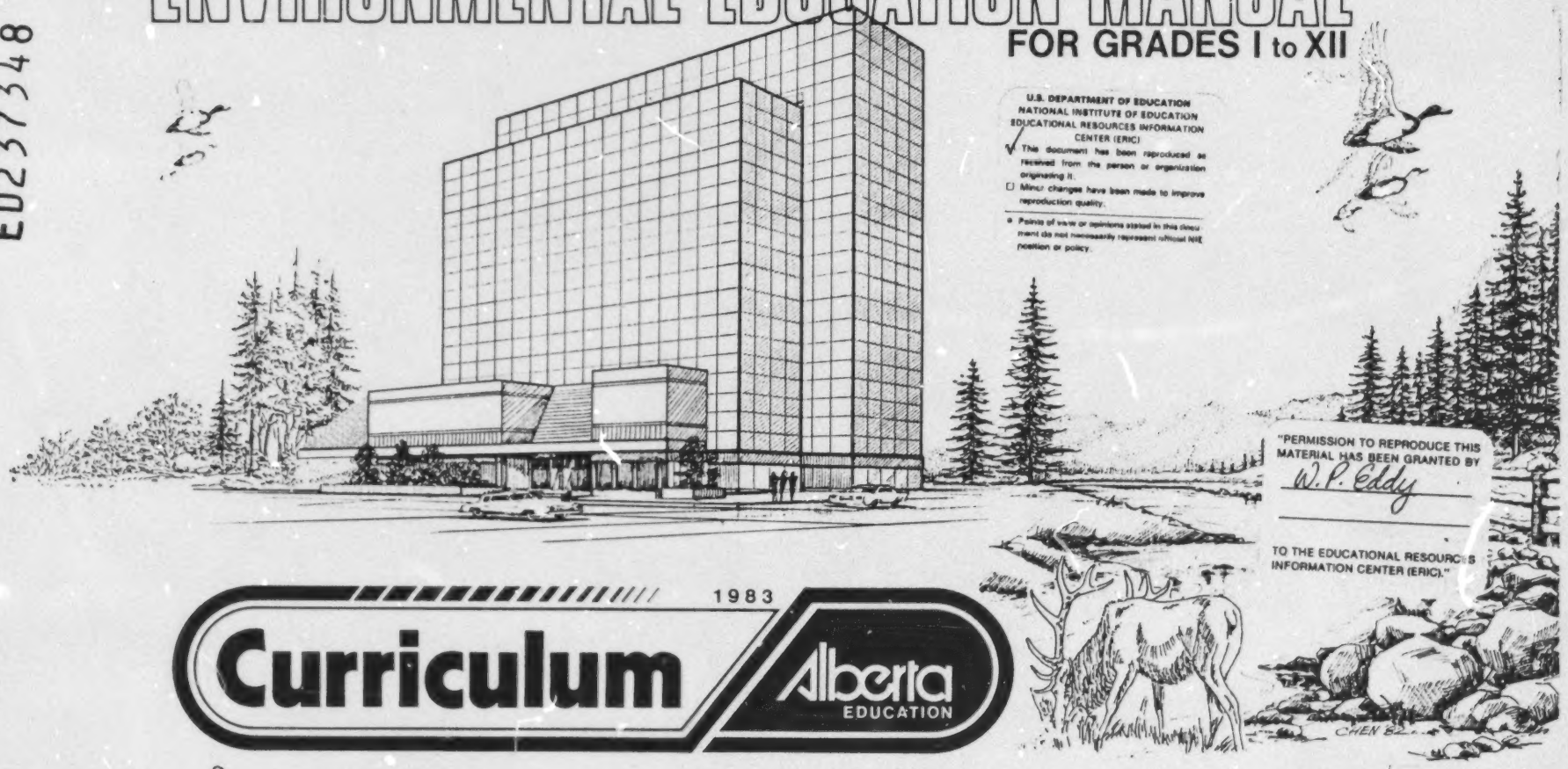
ENVIRONMENTAL EDUCATION MANUAL

FOR GRADES I to XII



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Curriculum

Alberta EDUCATION

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This publication is a service document and as such is not prescriptive. It has been prepared to assist school systems, their schools and their personnel in the planning, preparation and conduct of programs in environmental education for Grades One to Twelve.

AN ENVIRONMENTAL EDUCATION CATALOGUE OF RESOURCES

A companion document, an *Environmental Education Catalogue of Resources*, has been made available to Alberta schools. This catalogue lists resources in three categories —

- Print Resources (books, texts, pamphlets, etc.)
- Non-Print Resources (films, filmstrips, tapes, etc.)
- Physical Resources (visitation sites and teachable resources for environmental education) listed in five zones of the province.

ENVIRONMENTAL EDUCATION & SPECIAL EDUCATION GROUPS

Alberta Education firmly believes that environmental education activities have an important place in all special education programs, whether delivered in a special class or in a regular class setting. In addition to the environmental education sections found in the special education curricula, teachers of handicapped pupils are encouraged to select and modify any of the content and ideas found in the manual or in the companion document, *Environmental Education Catalogue of Resources*.

Developed by J. Reg Houghton, Coordinator of Environmental Education
Produced by Alberta Education
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INTRODUCTION

It has been just a few years now since the words "ecology" and "pollution" have become a part of our everyday language. Until recently, people just could not see the connection between the pollution of the environment, the loss of eagles and bison and certain wild plants, and their own survival. Now, hopefully, they are beginning to see that Man, the animal, is part of the total complex life system on earth and that Man, too, is one of the endangered species.

Education, some would say, should provide people with an array of knowledge and skills which will help them to survive. Although not everyone can or should be expected to learn everything or the same things, there must be a nucleus, some body of data and information, some set of practices or activities, which may be described as essential.

At least a part of this essential core could be said to focus on environmental education. It can be assumed that all people will walk on the same planet, breathe the same air, be warmed by the same sun, eat similar kinds of food, drink the same water, grow crops in the same soil and seek protection from and shelter within the same sort of environment. Knowledge and awareness about these surroundings is important to the individual.

Such knowledge and awareness might be quite straightforward were it not for the rapid pace of technological advances. The environment simply is in a constant state of change accelerated by the impact of MAN. Within less than one lifetime humans have progressed from an earthbound state to a point where they challenge the reaches of outer space. Education faces the task of trying to keep pace with the rate of environmental change.

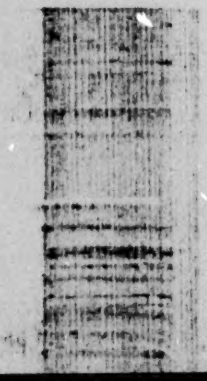
The following pages provide one approach — a beginning toward handling the problem. Teachers and administrators are encouraged to present concepts in environmental education to their students using this system or any other. The future may depend on it.

For the purposes of the Alberta Education curriculum plan, the definition of environmental education selected is the one accepted by the nations of the world during the Belgrade Charter presentation of 1968. That definition of ENVIRONMENTAL EDUCATION is:

> that branch of education which seeks to develop a population that is aware of and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitments to work individually and collectively toward solutions of current problems and the prevention of new ones. It includes studies, investigations and activities which focus upon:
> - human interdependency with other life;
> - the responsible utilization, conservation and maintenance of the environment;
> - the acquisition of skills, concepts, information and attitudes necessary for functioning in the environment; and,
> - an aesthetic appreciation of the environment.

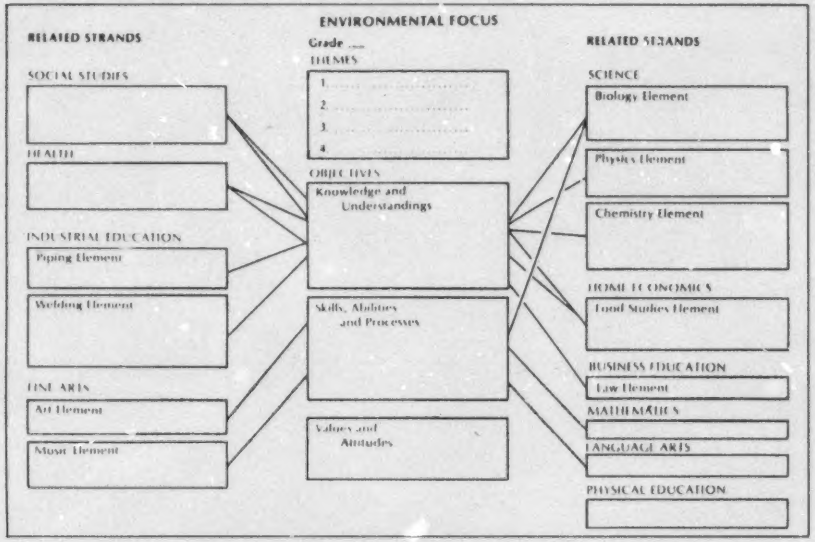
Environmental education should not be considered as a discipline like physics or biology, but as a dimension which encompasses all disciplines, touching on both the man-made and natural environments. It should be, in effect, an interdisciplinary process involving a multidisciplinary array of subject matter in which the interaction is important.

Environmental education falls naturally into two segments. Education *about* the environment may, quite properly, consist of conventional study, research and experimentation within the confines of the classroom, the library or the laboratory. Education *in and of* the environment can and should include some on-site study where the two-dimensional world of theory gives way to practice and investigation in the three-dimensional arena. This out-of-school component, while very important, should not become distorted by the mystique or excitement with which it may be associated. Further, it should not be the entire basis of any program.



THE STRUCTURE OF THE MANUAL

This Environmental Education Manual has been designed to accomplish a number of tasks. The most important of these is to present the interdisciplinary approach to environmental education in some sort of logical fashion. The end result is a curriculum plan model through which the relationships between concepts and ideas with an environmental focus and the various subjects or disciplines are displayed. This model takes the form of the diagram below.



The central column, headed Environmental Focus, is made up of two sections called Themes and Objectives. The theme statements have emerged or been derived from a survey of the available literature on environmental education. This information has been blended with equivalent descriptions of major purpose and focus originating within contributing subjects or disciplines. A set of four to six of these is provided for each of the grades.

The objectives statements have been sub-divided into the areas of:

- Knowledge and Understandings,
- Skills, Abilities and Processes, and
- Values and Attitudes.

These statements are essentially the result of a distillation process. Information originating within the separate subjects, as noted in the Related Strands, has been mixed and matched whenever such fusions are appropriate.

The knowledge and understandings are a synthesis of the many ideas, concepts, facts, etc., which could be taught in separate areas. The skills, abilities and processes are either what the learner may be perceived to need in order to address the knowledge and understandings or those which appear well suited for practice and use during a study. Values and attitudes are descriptions of what it is hoped the students may internalize or come to feel as a result of the investigations in which they have been involved.

In utilizing the interdisciplinary approach, this manual has pursued the plan thoroughly by involving virtually every subject that is taught as a part of the Alberta curriculum. The result, in some cases, is a complex network of weblike linkages which may appear, at least initially, to be somewhat overwhelming and difficult to follow. However, with some practice and through the introduction provided by the case studies these concerns should be alleviated.

THE CASE STUDY APPROACH

In an attempt to help the user become comfortable and familiar with the model of the curriculum plan, each grade is prefaced by a case study which describes a school setting and teaching situation. The studies are designed to "walk through" the model and allow the user to have some practice with its format and purpose.

The case studies are quite different one from another. All, however, are based on true situations. Although the program model referred to did not exist at the time, the conversations, approaches, activities and planning procedures did occur and the outcomes were very much as described. The names of the participating teachers, schools and locations have been concealed or made obscure.

Many of the users might find it useful to read through all of the case studies. It is likely that somewhere within them will be found a set of circumstances which closely parallels the user's own.

A sampling of the case studies includes —

Ms. T. Cher who teaches a Grade One class of 25 students in a rural school. She is skilled in language arts instruction and can play the guitar. She has a wide interest in sports and athletics. Her program starting point is at the theme, all-subject position.

Mr. Dick Shonery is a teacher of Grade Three in a community school. He has a double major in language arts and physical education. His starting point is within those two program strands.

Mr. Cy Entist possesses both a B.Ed. degree and a B.Sc. in biology. He is a bit of an amateur historian. His class of 30 Grade Five students is in a small southern Alberta town. He considers science to be the most important subject to be taught so his starting point is in the science strand.

The Grade Eight teacher is Irtha Waterlund who teaches in a large urban junior high school which utilizes a team teaching approach throughout. Irtha is the science expert and represents her team in the organization of the school's annual three-day camp program. This interdisciplinary planning is the focus of the study.

Environmentalist Olive Etti teaches business education, law and typing. Hers is a theme oriented approach to environmental education which starts in practical arts and embraces most of the other subjects in the school at the Grade Twelve level.

Two special case studies, focussing on the work of school administrators, are included in Appendix C.

ENVIRONMENTAL EDUCATION and the EDUCATOR

It would seem reasonable to suggest that each educator within the province utilizes a preferred set of strategies and modes of instruction and program delivery, possesses distinctly personal levels of interest and expertise in a number of areas and faces, each year, a virtually endless variety of teaching situations.

The recognition of this diversity, this spectrum of possibilities and alternatives, necessitates the presentation of a curriculum plan which at least attempts to offer a degree of flexibility consistent with such variety.

This *Environmental Education Manual for Grades I to XII* is designed for all educators. It recognizes that not everyone is an avid environmentalist, nor should they be. It recognizes that not everyone must take students out of the school on field studies or exotic tours. It recognizes that not all classes, schools, communities or situations are the same. At the same time, it points out that everyone can contribute toward the attainment of the goals and objectives of environmental education in some way and the range of these contributions is considerable.

There is no single teaching model to which all learners will respond favourably under all circumstances. Some students learn best when the teacher or leader is acting as a presenter of information. Others learn best when there is an atmosphere of teacher-learner interaction. It is important for the educator to assess the situation and the available personal skills and blend the two in an effort to achieve the best learning environment.

Most assuredly the approach and the attitude of the individual is vital. If the example set or the impression conveyed to the students is not consistent with an environmental concern then little of any consequence will result. The role of the educator is to expose the learner to the world and community environments in an effort to identify environmental interests and concerns. The instructor then assists in working through the processes of problem-solving and value clarification as they relate to the situation. In this process, the learners should be developing attitudes, values, skills and behaviour patterns important in producing environmentally literate citizens.

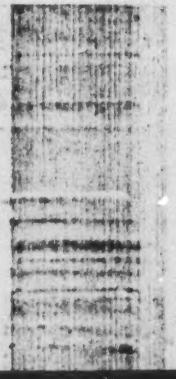
USING THE ENVIRONMENTAL EDUCATION MANUAL

Few teachers have had either the time or the inclination to read each and every one of the curriculum documents in use within the province. With this in mind, the developers of this manual have attempted to "fill the gap", so to speak, by identifying material in each of a host of subjects which would appear to be related, directly or indirectly to concepts in environmental education.

Each grade-page for the manual has been organized in the same way. The "environmental focus" column lists the suggested themes for the particular grade and the recommended objective statements in the areas of knowledge and understandings, skills, abilities and processes, and values and attitudes. These are connected, through a system of linking arrows, to either of two columns housing the "related strands" of material found within individual subject areas or disciplines. Introductory case studies are offered for all grades.

In many cases the reader may wonder at some of the connections claimed by the document. Some may feel that several of the cited relationships are tenuous while others may suggest that many important linkages have been overlooked. The user should feel free to use selectively what is provided and to supplement wherever appropriate.

The user is invited to turn to the page where the model for the selected grade is located. The model chart will be a fold-out of two or three panels on the page immediately following.



An approach to planning can originate in any section of the model. The individual may limit environmental education instruction to the material listed for a single subject. The opportunity is there, however, to expand the planned program to include material from other areas or to engage in a team teaching or team planning exercise. One can track a variety of linkages from the subject to the focus or from the focus to one or more subjects. Subjects may be linked to content or skill objectives and virtually all subjects are represented.

The *Environmental Education Manual For Grades 1 to 12* points the way for the user to go in a design for environmental education. Inside the boxes located within each Subject Strand are abbreviated statements about the learning or concept found there. It falls to the teacher to examine the "parent" volume in order to obtain more complete and precise information. For example, at the Grade Four level, under the Social Studies Strand the statement is:

> **Topic A** — "Alberta: Past, Present and Future" discusses the availability of natural resources as one factor which can determine the way in which people can meet physical, economic and social needs. Conservation, consumption and the use of renewable or non-renewable resources are ideas worthy of examination.

Obviously, when the teacher refers to the appropriate pages of the *1981 Alberta Social Studies Curriculum* (pp. 34-35), there will be much more material provided. It may be that only a part of a particular unit or reference actually applies to environmental education.

Some of the subject documents in the Alberta curriculum are not necessarily grade specific. The *Elementary Science Curriculum Guide — 1980*, for example, is organized on a divisional basis. Similarly, the junior high school programs in home economics and industrial education may have their content presented in any of several grade or sequence patterns. In cases like these the developers of the environmental education plan have made some arbitrary assignments of topics based on the 'fit' of the material to the grade objectives and to other curricula having a grade-specific organization.

While it is recognized that many subjects have within them an emphasis on the development of values and attitudes, it was decided to forego the linking of the subject strands to those objective statements. This decision was made because we would hope that all subjects and all teaching contribute to such development, and the additional lines or connectors would so increase the complexity of the interdisciplinary linkages as to reduce the model's usefulness.

ISSUES IN ENVIRONMENTAL EDUCATION

Environmental education, focussing as it does upon the "responsible utilization, conservation and maintenance of the environment", should attempt to provide a reasonably balanced and biased view of the environmental issues. Environmental problems are exceedingly complex and, therefore, curriculum development and instructional design must not be viewed in a simplistic manner. It is often tempting to take the "pure environment" approach and label entire segments of society as "bad guys". On the other hand, it is often convenient to view situations from the "importance of progress" perspective. In truth, neither extreme would seem appropriate.

It should be remembered that some environmental questions will be popular and some will be distinctly unpopular and open to controversy. A region whose economy is based on the coal mining industry may not take kindly to the suggestion that this may have severe, long-term, negative effects on the environment. On the other hand, the possibility of a hazardous waste disposal site being located nearby may be highly topical in the minds of community members who view it as a threat to their way of life.

Students should be encouraged to face issues squarely and tackle them with appropriate strategies. At the same time they must be cautioned as to the need for solid, factual and valid information in order to arrive at logical and rational conclusions and decisions.

Administrators and teachers are advised to examine Alberta Education's *Controversial Issues Policy Statement*, with particular reference to:

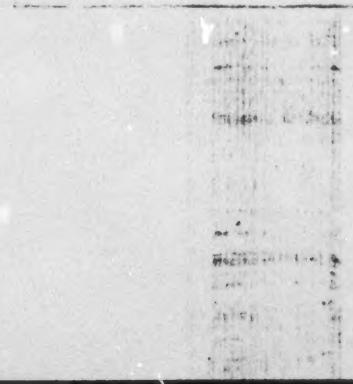
> 1. Students in Alberta classrooms should not be ridiculed or embarrassed for positions which they hold on any issues, a requirement which calls for sensitivity on the part of teachers, students and other participants in dealing with such issues.
> 2. Students should have experience in selecting and organizing information in order to draw intelligent conclusions from it. For sound judgements to be made, information regarding controversial issues should:
>   a) represent alternative points of view,
>   b) appropriately reflect the maturity, capabilities and educational needs of the students and reflect the requirements of the course as stated in the Program of Studies,
>   c) reflect the neighborhood and community in which the school is located, but not to the exclusion of provincial, national and international contexts.

OUT-OF-SCHOOL STUDY OR FIELD TRIPS

The introduction to this document makes references to two segments of environmental education:

a) education *about* the environment which may consist of conventional study, research and experimentation within the classroom, library or laboratory, and
b) education *in and of* the environment which includes out-of-school or on-site practice and investigation.

Out-of-school or on-site activities or field studies usually involve a different set

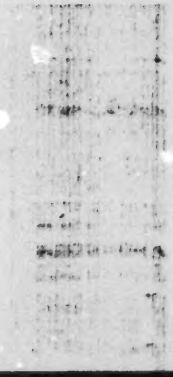


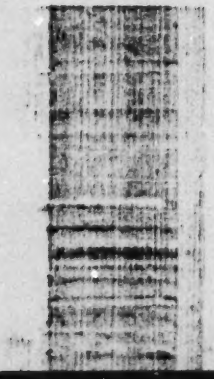
of parameters than do those within the regular school setting. The vast majority of jurisdictions have particular policies and regulations which apply to this unique teaching situation. Most jurisdictions also have obtained supplemental insurance coverage designed to protect them and their staff, students and volunteers. Such additional care and protection is important, especially in the light of certain activities or locales which might expose individuals to some element of risk.

Environmental or outdoor education studies should be of a developmental design. The term "developmental" applies not only to the logical progression of content and skill but also to the physical and emotional capability and "copeability" of the participants.

The pattern most commonly found appears to be:

a) Brief out-of-school activities on the playground — ALL GRADES
b) Longer trips within the immediate community adjacent to the school — ALL GRADES
c) Half-day/all-day trips or tours within the community — ALL GRADES
d) Half-day/all-day trips to locations beyond the community — ALL GRADES, BUT MOSTLY GRADE FOUR AND HIGHER
e) Overnight/residence activities at various locations — UPPER ELEMENTARY AND HIGHER
f) Out-of-province and out-of-country travel — SECONDARY SCHOOLS, MAINLY HIGH SCHOOLS





CASE STUDY
GRADE ONE

Setting

Ms. T. Cher is in charge of a Grade One class of 25 students in a rural school. Like many Division One teachers, she is responsible for all subjects. Her main areas of expertise are language arts and reading instruction. Ms. Cher can play the guitar and has a wide interest in sports and athletics. She is personally concerned about the environment and wants to do something interesting in that field with her class.

Planning — Part One

Ms. T. Cher selected the *Environmental Education Manual* as her starting point. An examination of the Grade One section prompted her to decide on a theme approach and she selected **Themes.**

- *All living things have definite characteristics some of which assist them in coping with their environment.*

Ms. Cher wanted to accomplish a number of things with her class. She was particularly concerned that the children develop a good self-image, begin to have a positive feeling about their environment and establish some good basic skills for learning to read. She selected, therefore, the following statements of objectives:

Objectives

Under **Knowledge and Understandings** she identified:

- *that all living things are important to and an integral part of the environment;*
- *that animals and humans have basic characteristics some of which are common and others which are unique.*

Under **Skills, Abilities and Processes** she identified:

- *observing the environment, and things within it, using the basic five senses;*
- *classifying, using the skills of grouping or ordering, on the basis of such properties as size, shape or colour;*
- *measuring, using non-standard units;*
- *listening to and responding to others;*
- *listening to musical stories and environmental sounds;*
- *speaking with fluency about familiar and personal experiences.*

Under **Values and Attitudes,** she identified:

- *individuals are special and important and what they are and do makes a difference to other people and to the environment;*
- *the more individuals know about their environment the more comfortable and happy they will be within it.*

Planning — Part Two

Ms. T. Cher was understandably anxious to bring a number of subjects together in her unit study. Returning to the model, she was able to trace the objectives to the particular subject strands which could both validate her approach and locate useful subject information that could be included. The arrows, or linking lines, formed an almost interdisciplinary network from which she was able to determine that her:

Social Studies Curriculum Guide has within it concepts which support her objectives. These include:

- *Topic A — "Me As An Individual" which discusses the unique and common characteristics found in all people.*

Science Curriculum Guide has within it concepts which support her objectives, such as:

- *all people have characteristics, some of which are unique and some of which are common to all people. These characteristics include sex, height, weight, colour (eyes, skin, hair, etc.), and ability (physical and mental);*
- *the properties of objects can be identified by using the senses of touch, hearing, taste, smell and sight;*
- *objects can be classified, grouped or ordered according to one or more properties.*

Health Curriculum Guide has within it concepts which support her objectives, such as:

- *understands that there are similarities and differences among people: size, weight, eye and hair colour, fingerprints, occupation, ability (physical and mental), and talent;*
- *recognizes that the body has special abilities called senses;*
- *understands the skin is a protective covering and sensory organ.*

The emphasis that was planned in skills, abilities and processes was further addressed in the:

Language Arts Guide which says:

- *discriminates and notes similarities and differences, and*
- *is expressive and fluent about personal experiences.*

Mathematics Guide which notes:

- *recognizes basic shapes, and*
- *compares objects and uses non-standard units of measurement.*

Physical Education Guide which states:

- *learns that people (children) learn to walk (hike) through their environment (fitness);*

and the

Music Guide which suggests:

- *learns that one can listen and respond to sounds from the environment . . .*

Ms. T. Cher was of the opinion that by emphasizing the **Values and Attitudes** dimensions, particularly as reflected in health and social studies, and by setting a good example herself, she could help the students develop good feelings of self-worth and begin to develop sensitivity toward the environment.

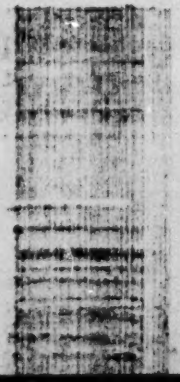
Resources and Activities

The resources listed in the guides were deemed to be adequate for the needs of the units. Those found in the **Elementary Science Curriculum Guide** looked especially valuable.

It seemed logical that much could be done out-of-doors on the playground and in the immediate area of the school. Ms. T. Cher jotted down a few ideas that came to mind.

1. Shapes — using the outlines of signs, roofs, windows, houses, etc.,
2. Sizes — comparing buildings and other objects some of which could be measured using string and rope
3. Colours — the sense of sight, and students could develop and practise vocabulary
4. Texture — touching such surfaces as walls, fences and sidewalks while developing and practising vocabulary
5. Sounds — students can build more vocabulary while listening to sounds
6. Recording — Polaroid pictures could be taken during an out-of-school trip and then used in an experience chart

These ideas, plus any number which might be found in the companion document, *Catalogue of Resources for Environmental Education — Grades I to XII*, were sufficient to frame a better than average environmental education unit.



GRADE ONE

ENVIRONMENTAL FOCUS

THEMES

THEME: All living things are a part of the environment and must develop a sensitivity to their environment.

THEME: All living things have definite characteristics, some of which assist them in coping with their environment.

THEME: All living things have certain basic and other needs, many of which are met by using the environment and are affected by the environment.

THEME: Many living things gather together in families or other groups in order to help satisfy their needs.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

The environment can provide the basic necessities of life such as air, soil, water and energy from the sun.

All living things are important to and an integral part of the environment.

All living things have certain basic needs that must be satisfied, and these include the need for food, clothing (or covering), shelter, care and love.

Many living things come together in families and other group structures to help in the satisfaction of basic needs.

Animals and humans have basic characteristics some of which are common and others which are unique.

The environment is not always the same and sometimes may have dangers within it.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

observing the environment and things within it, using the basic five senses.

classifying, using the skills of grouping or ordering on the basis of such properties as size, shape or colour.

measuring, using non-standard units.

graphing, of a simple type using pictures and objects.

communicating, using simple drawings and printmaking as well as formed or sculpted figures.

communicating, using a developing written and oral vocabulary for expressing ideas and issuing simple directions.

listening to and responding to others.

speaking with fluency about familiar and personal experiences.

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC A – "Me As An Individual" discusses the fact that each person has some needs and characteristics which are unique and others that are common to all people. Self-concept is important. Needs include food, clothing, shelter, care and love. Characteristics include the physical, social and emotional.

ELECTIVE A – "Taking Care of Myself" involves an examination of the environment to identify threats to health and safety. Problem areas may involve things like dangerous crosswalks, building sites and heavy equipment. Sometimes the people in our environment (like policemen and firemen) are nice and sometimes they are not to be trusted.

TOPIC B – "Me In My Family" discusses the fact that all families have certain basic needs which may be satisfied in different ways reflecting changing roles, responsibilities and family structures.

ELECTIVE B – "Families At Play" allows the student to become more aware of the recreational opportunities within the community. Discussions about vacations and travel and the things people do for enjoyment may broaden the student's perspectives.

TOPIC C – "Canadian Families" sees ours as a multi-cultural society with numerous similarities among families, and many uniquenesses and differences.

ELECTIVE C – "Family Life In Other Parts of the World" and "Family Life In Early Settlement Times" are units which lead students to an awareness of the similarities and differences between families of today and those of other times and places.

HEALTH — the student

recognizes that a number of occupations are required to maintain homes, schools and neighbourhoods.

recognizes the importance of membership in a family or group and the need to work and play together.

learns the mutual benefits of sharing and interdependence.

understands that there are similarities and differences among people — size, weight, eye and hair colour, fingerprints, occupation, ability (physical and mental) and talent.

understands rules for pedestrians and is aware of safety procedures for the home, school and community.

recognizes that the body has special abilities called senses.

understands that the skin is a protective covering and a sensory organ.

FINE ARTS

ART ELEMENT — the student

draws and paints figures and items found in his or her personal experiences and the familiar environments of the home and the school.

RELATED STRANDS

SCIENCE — the student learns that

people need energy to work and play. Plants and animals need energy to live. The sun is the source of all energy.

water is a basic need for all forms of life.

people have young and create families. Families have certain basic needs which include food, clothing, shelter, care and love.

all people have characteristics, some of which are unique and some of which are common to all people. These characteristics include sex, height, weight, colour (eyes, skin, hair, etc.), and ability (physical and mental).

the weather and changing seasons affect people. A good example would be the many changes that take place in the environment and the neighbourhood.

the properties of objects can be identified by using the senses of touch, hearing, taste, smell and sight.

within the environment, objects may be classified as living and non-living.

objects can be classified, grouped or ordered according to one or more properties such as size, shape or colour.

information can be recorded in words, pictures or graph form.

MATHEMATICS — the student

recognizes basic shapes.

compares objects and uses non-standard units of measurement.

collects data from the environment and constructs graphs using pictures or objects.

LANGUAGE ARTS — the student

discriminates and notes similarities and differences.

understands non-print visuals and pictures.

begins to develop and expand a vocabulary.

issues simple directions and instructions.

responds to a speaker.

is expressive and fluent about personal experiences.

PHYSICAL EDUCATION — the student

understands the need for proper attire for certain activities including those prac-

ART ELEMENT — the student

- draws and paints figures and items found in his or her personal experiences and the familiar environments of the home and the school.
- shows figures and shapes of animals, people, buildings, etc., in sculpture/model form.
- does printmaking using textures from the environment, and items such as weeds, leaves and flowers.

MUSIC ELEMENT — the student

- listens and responds to sounds from the environment such as may be heard in the home, from machines or caused by weather, and recognizes that these sounds can be musical and rhythmic.
- recognizes that music, like language, can describe or tell a story about people, places or events in the environment.

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

- listening to and responding to others.
- speaking with fluency about familiar and personal experiences.
- listening to musical stories and environmental sounds.
- moving and showing large muscle control while walking, hiking or skating.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

- individuals are special and important and what they are and do makes a difference to other people and to the environment.
- by becoming aware of the environment, individuals can begin to learn about some of the beneficial and harmful things within it.
- individuals can make choices and decisions which affect them and their environment.
- the more individuals know about their environment the more comfortable and happy they will be within it.

- is expressive and fluent about personal experiences.

PHYSICAL EDUCATION — the student

- understands the need for proper attire for certain activities including those practised in extreme weather conditions. (Fitness Dimension)
- practises simple folk dances using walking and clapping in rhythm. (Dance Dimension)
- uses muscles and imagination to make movements like certain animals. (Gymnastics Dimension)
- recognizes that people (children) should learn to hike (walk) through the environment. (Fitness Dimension)
- learns that another way to travel through the environment is by learning to skate. (Gymnastics Dimension)

CASE STUDY

GRADE TWO

Setting

Ms. Ella Mentry teaches a Grade Two class of 27 students in a large urban centre. Although she teaches all subjects, she is a history major and has a great interest in social studies having taken a number of in-service courses. She enjoys teaching mathematics but science makes her nervous. Ella has taught for quite a number of years. Her husband is an attorney. She is an avid reader and loves to curl.

Planning — Part One

Ms. Mentry was preparing her social studies program for the year. She knew that she should be doing something in the area of environmental education but she did not know how to begin. After all, the place for that was in science, or so she thought.

Looking through her **Social Studies Curriculum Guide** she was able to determine that her major thrusts for the year would be:

- *"Exploring My Own Neighbourhood";*
- *"Canadian Communities Today";*
- *"Neighbourhoods Around The World".*

A further study of the **Elective** portion of the guide suggested that these thrusts could be conveniently supplemented by the material recommended under the topics:

- *"Community Services";*
- *"Disposing Of Our Garbage";*
- *"Dividing Our Environment Into Useful Space".*

The word "Environment" caught her eye. Maybe, just maybe, there was some environmental education material in the social studies. Taking her copy of the *Environmental Education Manual*, she turned to the model diagram suggested for Grade Two. Most of the things she had been considering were shown in the **Social Studies Strand** and, interestingly, lines or arrows from them seemed to focus on several objective statements under **Knowledge and Understandings.** These were:

- *that the environment may be divided into two sections — the natural and the man-made, and that the environment is constantly changing due to the influences of nature or man;*
- *that groups and populations of living things often come together to form communities; that communities may be formed to meet specific needs, and that sometimes the formation of communities results in new needs and problems being identified;*
- *that human beings, and some animals, have learned to find their way and travel through the environment using instinct and/or knowledge of a region or area landmarks, and that humans may use machines or other devices to aid their movement or travel.*

Ella noted that there were other linking lines or arrows leading from those objectives to the **Health Strand** where suggested learnings included:

- *understands that many occupations exist within an individual's environment, and that these provide services and produce goods;*
- *identifies and describes personal and family safety practices.*

and to the **Science Strand** where it stated:

- *living things exist within their habitats. Human beings build homes within their habitats;*
- *the term "population" describes a group of organisms in the same kind of particular environment. The place of a population is its habitat. Different populations in a habitat make a community;*
- *objects may be located in terms of distance and direction from a reference point or landmark. Locations can be shown on a grid such as a simple chart or map.*

and to the **Mathematics Strand** which read:

- *the student reads and understands simple maps and charts;*
- *the student can develop charts and graphs.*

Ella also noted that these subject areas had additional linkages, which led to the section on **Skills, Abilities and Processes.** She selected some which seemed especially appropriate to the activities she was considering. These were:

- *graphing using pictographs, bar graphs and grids;*
- *recognizing the concept of compass direction;*
- *classification, using expanded criteria such as number, relative size, position, two-dimensional shapes, colour, texture, etc.*

Ms. Mentry realized that what had started out as a social studies plan had now matured to a point where there were strong elements of other subjects included. Even the **Values** statement could be and was included for environmental education, as she noted:

- *laws, rules, regulations and controls may become necessary when populations gather together in order to protect individuals and their surroundings and property;*
- *people gathering together to help provide basic needs may create problems for themselves and for the environment which could require consideration and treatment.*

Planning — Part Two

Ms. Ella Mentry realized that her study of communities and neighbourhoods could benefit by actually taking the students out of the school and into the community. She discussed with her principal the possibilities of renting buses or of asking parents to assist by driving students in their private automobiles. It was decided to canvass parents and hold a meeting to see what support there might be.

During the parent meeting Ella described the manner in which the units involved so many of the subjects and concepts within them. She pointed out the ways in which parents could help by acting as drivers but also functioning as docents (trained guides) and as teacher aides. A number of parents agreed to help and Ella soon had a list of ten people on whom she could call.

Resources and Activities

In addition to the resources listed in the subject guides for the individual subjects, Ella felt that there were some other items she needed and could use.

1. District and City Maps — obtained from the school board, the city or from real estate companies
2. Road Maps — obtained from Travel Alberta or through parents

She also felt, and this was discussed with her parent group, that visits could be arranged with:

1. The Mayor or someone at City Hall
2. The garbage dump or waste disposal plant
3. A hospital
4. A fire station
5. A police station
6. Parks, businesses, etc., in the area near the school

Other activities could include:

1. Looking at the different homes that are built by humans and animals
2. Having her husband come to class to talk about laws and rules
3. Having her principal come to class to talk about school rules and regulations
4. Having students work on maps which showed the location of their homes, major stores, etc.

Ms. Ella Mentry decided that her units of study would be quite interesting and that she would actually be able to save time by teaching some material in the interdisciplinary style.

GRADE TWO

ENVIRONMENTAL FOCUS

THEMES

THEME: The environment is constantly changing. The changes may be due to forces of nature or the result of the actions and behaviour of people.

THEME: The environment (the world) is very large and complex. Humans have created and use many methods to find their way and travel through the environment.

THEME: Living things often come together in order to help satisfy their needs. Groups and communities are formed. Within human communities new needs and new problems may be created as a result of banding together.

THEME: Many forms of energy exist and are used within the environment.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- The environment may be considered as having two parts, the natural and the man-made, and the environment is constantly changing due to the influences of nature or man.
- Groups and populations of living things often form communities in order to meet specific needs. Sometimes the formation of communities results in new needs and problems being identified.
- The environment and its conditions frequently determine where and how living things may exist.
- There are many types and sources of energy which may be found within the environment.
- Human beings and other animals have learned to find their way and travel through the environment using instinct and/or their knowledge of a region and its landmarks. Human beings may use machines and other devices to aid their movement or travel.
- Living and non-living things may be grouped or classified according to their special characteristics. These characteristics may help to determine the place and position of something within the environment.
- Individuals of a species are important to the group. Each member affects others and is, in turn, affected by the members and the group.
- Humans and other living things grow through stages and at differing rates. Growth may be affected by nutrition.
- Any person, at any age, can affect the environment in a positive or negative way.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES such as:

- observing, using the five senses with greater skill to notice less obvious differences in shape, size, colour, texture, etc.
- classifying, using expanded criteria such as number, relative size, position, two-dimensional shapes, colour, texture, etc.

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC A — "Exploring My Own Neighbourhood" focusses on aspects of the community that are significant in the lives of young children. The study may involve:

1) the natural and man-made features within the community which may become landmarks and help people find their way and locate things
2) the facilities and services within the community which affect people
3) the rules and laws which are necessary to help and protect people

TOPIC B — "Canadian Communities Today" explores the notion that the number of living things in an area make up the population, and the density of the population affects the way the members live.

ELECTIVE B — "Disposing Of Our Garbage" brings to the attention of the pupils that the waste generated by groups of people, and its disposal, is becoming a very serious and costly problem. Reuse and recycling are discussed.

ELECTIVE B — "Community Services" explores the various types of services which are required within a community and that, as communities grow and change, the needs and the services to meet them may also change.

TOPIC C — "Neighbourhoods Around the World" examines how the natural and physical environment and the needs and values of groups will affect the ways in which communities are planned and developed.

ELECTIVE C — "Dividing Our Environment Into Useful Space" introduces the ideas of planning and organizing to get the best use of the space and resources available. The recording of information, using drawings, maps and charts is necessary. Planners must consider such things as land zoning, traffic routes and other factors.

HEALTH — the student

- understands that many occupations exist within an individual's environment, and that these provide services and produce goods.
- is able to identify and describe personal and family safety practices.
- understands one's own importance as an individual or member of a group and that we affect and are affected by the actions of others.
- recognizes that all persons have strengths and weaknesses.
- recognizes that humans grow through stages but sometimes at different rates.
- understands that the body needs adequate nutritional food, rest and exercise in order to have sufficient energy.

RELATED STRANDS

SCIENCE — the student learns that

- the environment parts can be classified as man-made and natural. Humans can change the environment in many ways.
- water is a force which can change the environment.
- living things exist within habitats. Human beings build homes within their habitats.
- the term "population" describes a group of organisms in the same kind of particular environment. The place of a population is its habitat. Different populations in a habitat make a community.
- some energy resources include wind, water and wood. In some ways these are renewable resources.
- heat is a form of energy. Temperature is a measure of heat energy which can be recorded with a thermometer.
- light is a form of energy which is necessary for the growth of most living things.
- animals have similar and different characteristics and may be grouped or classified according to those characteristics or properties.
- objects may be located in terms of distance and direction from a reference point or landmark. Locations can be shown on a grid such as a simple chart or map.
- the ability to record and communicate information is important.

MATHEMATICS — the student

- classifies two-dimensional shapes in relation to corners, edges and faces.
- reads the Celsius thermometer to five degree intervals.
- estimates and uses standard measurement units.
- constructs and interprets pictographs and simple bar graphs using data collected from the immediate environment.
- understands the concept of coordinates on a grid or graph.
- reads and writes numerals from 0 to 999.

LANGUAGE ARTS — the student

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recognizes that humans grow through stages but sometimes at different rates.

understands that the body needs adequate nutritional food, rest and exercise in order to have sufficient energy.

recognizes personal responsibility for classroom appearance and condition.

FINE ARTS

ART ELEMENT — the student

uses rubbing technique on textured surfaces found in the environment, such as buildings and trees, etc., and notes roughness, smoothness and patterns of texture.

draws and paints images and pictures of items found within the broader environment.

expresses, in sculpture form, the figures of animals such as may be found in a zoo or on a farm.

recognizes that the art of the past and present can help in the understanding of the history, interests and values of a culture.

MUSIC ELEMENT — the student

recognizes that music has texture, rhythm and patterns in a way similar to those found in art and buildings.

understands that music can express themes such as changes in the environment through the seasons.

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

classifying, using expanded criteria such as number, relative size, position, two-dimensional shapes, colour, texture, etc.

measuring, using some standard units and some measuring instruments.

recognizing the concept of compass direction.

graphing, using pictographs, bar graphs and grids.

communications, both verbal and written, in the preparation and presentation of a simple paragraph report and two-step and three-step instructions.

communicating, using the art forms of drawing, painting and sculpture.

reading to draw conclusions at an appropriate vocabulary and number level.

predicting and determining relationships.

interpreting music to note texture, rhythm, patterns and themes as well as examining selections reflecting topics such as environmental change and the seasons of the year.

improving large muscle control while negotiating barriers.

improving muscle control through skating and more difficult rhythmic movements.

reads and writes numerals from 0 to 999.

LANGUAGE ARTS — the student

reads and understands simple maps and charts.

can develop charts and graphs.

can write a short paragraph such as might develop from an experience chart.

can orally deliver a simple report.

can prepare and present three-step instructions or directions.

reads with an understanding of content and context and can draw conclusions.

broadens speaking and writing vocabulary.

is able to predict and determine relationships.

PHYSICAL EDUCATION — the student

begins the skills of orienteering. (Outdoor Pursuits Dimension)

improves body control through climbing and crawling over and under barriers. (Fitness and Gymnastic Dimensions)

reviews simple folk dances with more difficult elements of running, jumping and hopping. (Dance Dimension)

improves skating skills. (Outdoor Pursuits Dimension)

learns to move rhythmically imitating the movements in nature, e.g., trees in the wind. (Dance and Fitness Dimensions)

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of students, such as:

laws, rules, regulations and controls may become necessary when populations gather together, in order to protect individuals and their surroundings and property.

people gathering together to help provide basic needs may in turn create problems for themselves and for the environment which could require consideration and treatment.

when families and groups make decisions which may affect the environment they should have sufficient knowledge and understanding to realize their responsibility and the consequences of the decisions.

there are many beautiful sights within the environment and efforts should be made not to spoil them.

CASE STUDY

GRADE THREE

Setting

Mr. Dick Shonery is a teacher of Grade Three in a community school. Dick has a double major in his degree — language arts and physical education. Within the school, Mr. Shonery teaches some additional physical education classes for which, in return, other teachers handle his music and art. He is very oriented to the outdoors, as is demonstrated by his membership in the Alberta Camping Association and his frequent weekend camping, fishing and hunting excursions.

Planning — Part One

Mr. Shonery is concerned about the physical well-being of the students in his care. Because he himself enjoys the outdoors (the environment) he would like to share some of that feeling. So far as in-school teaching is concerned, Dick's belief is that it is essential for youngsters to master the fundamentals of reading, listening, writing and speaking.

An examination of the newly issued *Environmental Education Manual* gave him an opportunity to explore the connections between language arts, physical education and environmental education. Until recently, he knew, environmental education seemed to be largely in the domain of science and social studies. His feeling had been that it was broader and more interdisciplinary than that. He was interested, then, in this more novel approach.

Under the **Language Arts Strand** he was pleased to note:

- *speaks with fluency on complex subjects such as may emerge in environmental study;*
- *reads, obtains information and organizes material from a variety of complex resources such as reference books, dictionaries, charts, maps, etc.*
- *uses language effectively in formal and informal ways;*
- *shows ability to dramatize situations;*
- *demonstrates skill in the interview technique.*

Under the **Physical Education Strand** there was listed:

- *knows that the body is an environment of its own. We maintain this "environment" with proper nutritional food, ample rest and care, sensible clothing and suitable exercise;*
- *relines basic orienteering skills using the direction compass;*
- *understands the relationship between extreme weather conditions and exercise;*
- *may be introduced to the skill of snowshoeing.*

The Grade Three page of the *Environmental Education Manual* went further and allowed him to determine the way in which his subject areas could relate to environmental education.

Following the linking or arrows from the **Language Arts** and **Physical Education Strands,** Dick located the following:

Under **Knowledge and Understandings** he found:

- *that the human body is by itself a special environment having needs and possessing exceptional abilities and characteristics which set it apart from other living things;*
- *that the environment affects where and how people live and influences their choice of location, occupation and lifestyle.*

These two, in turn, were linked to other strands.

The **Health Strand** offered:

- *observes that people differ from one another in certain physical, intellectual and social characteristics;*
- *identifies changes in the environment, such as snow, fog, rain, wind and fire, which affect safety.*

The **Science Strand** offered:

- *there are many variations within the environment, and the environment, with its many elements, is constantly changing.*

The **Social Studies Strand** offered, in "Bringing Canadian Communities Closer Together" and "Communities In Canada", the fact that communities are affected by the geographic features and transportation and communication systems. Students are encouraged to note differences and similarities among communities.

Under **Skills, Abilities** and **Processes** he found:

- *communicating using formal and informal language, both verbally and in written form, on more complex subjects and using a wider variety of information sources;*
- *communicating using such art forms as drawing, painting, printmaking and sculpting while employing colour, texture and patterns;*
- *interviewing as a technique for gathering information leads to improved questioning techniques.*

These in turn, defined connections to other subject strands.

The **Mathematics Strand** suggested:

- *reads and writes basic common fractions and decimals in 10ths;*
- *reads and writes numerals to 9,999.*

The **Fine Arts Strand** suggested the various skills and practices in *printmaking, drawing and painting, etc.*

Dick Shonery decided to try to work all of this related material and information together around a unit or units of study focussing upon "The Human Body as an Environment Having a Need to Function and Exist Within a Larger Environment". To this end, he enlisted the aid of the teachers who were instructing his class in music and art.

Planning — Part Two

Mr. Shonery determined that he could achieve some of these goals by a special focus on the **Values and Attitude** statement:

- *The human body is precious, as are all forms of life. Individuals should know about the body and its needs, as well as the environment in which it exists in order to select the best alternatives for its care and keeping.*

He could include a variety of ideas for the children to consider, such as avoidance of drugs and alcohol; good nutrition; ample exercise; cleanliness and hygiene; self-reliance; cooperation; the development of a positive self-image, and the need for privacy.

Shonery planned to include a study of his school and the community in which it was located as well as the large community (the city) itself. He intended to discuss the reasons behind the city's location, growth and development, and to make some comparisons between it and a community located elsewhere. He expected the children to learn to read maps and charts, write letters seeking information and do some research study into the selected areas.

He wanted to take the children "out" into the community to see where, how and why it had developed. He wanted them to note the good things about the community as well as becoming aware of the problems or difficulties that might exist. He proposed, if he could get proper permission and agreement from his school administration and parents, to involve the students in at least one day-long activity away from the city.

Pre-planning for these activities would allow the students to:

a) plan proper nutritional meals
b) consider appropriate clothing
c) exhibit the ability to lead as well as follow, and
d) have an experience impossible to achieve within the regular classroom while practising skills and applying knowledge in a new situation

In discussing the proposed out-of-school studies with the principal and parents, Dick identified certain logistic requirements. He needed, for example:

1. Two or three people to help with supervision, first aid and safety routines
2. A "back-up" vehicle for use in the unlikely event of an accident
3. To inform the individual employed at the chosen site (ranger, warden, farmer, etc.), of his wish to use the area
4. To check each student's "kit" of clothing, food and other necessary items just prior to leaving
5. To develop some way of determining how successful and valuable such an excursion might be

Mr. Dick Shonery was able to report, upon return from the activity, that the study had been a great success.

GRADE THREE

ENVIRONMENTAL FOCUS

THEMES

THEME: All parts of the environment are related and interact with each other in some way.

THEME: All individuals within the particular environments occupy special places or niches.

THEME: Humans, within the environment, are unique in that they have abilities, characteristics and behaviours which set them apart from other living things.

THEME: All living things struggle to survive within the environment.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- Within the human community, the advances of technology have led to a growing need for large amounts of resources and raw materials.
- Modern technology consumes large amounts of energy and that energy has many forms such as heat, light, sound and electricity.
- The environment affects where and how people live and influences their choice of location, occupation and lifestyle.
- Information, gathered from the past, can frequently help people to understand the present and how it came to be.
- Most living things have an instinct for survival within the environment and often possess unique and special characteristics to aid them.
- Within the human community, factors like technological advances and mobility have created a need for interdependence and made separateness or isolation very difficult to maintain.
- All living organisms occupy necessary positions or niches within the environment and are interdependent with each other through such relationships as food webs or food chains.
- Matter, within the environment, exists in three basic forms and may be changed from one form to another.
- The human body is, by itself, a special environment having needs and possessing exceptional abilities and characteristics which set it apart from other living things.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

- observing using instruments, which extend the senses, such as magnifiers and thermometers and compasses.
- understanding basic compass directions.
- predicting, inferring and hypothesizing on the basis of study, and information and data gathered.
- observing and classifying using increasingly complex criteria and property.

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC A — "Interdependence of Communities in Canada Today" discusses the concept of rural and urban situations and the fact that most communities must exchange goods and services in order to meet their needs. As technology advances and communities become larger the amount of interdependency seems to increase.

ELECTIVE A — "Bringing Canadian Communities Closer Together" explores the effect of geographic features and major transportation and communication systems upon communities and their relationships.

ELECTIVE A — "Communities in Canada" allows students to do a careful comparison between their own and other communities and an examination of the reasons for similarities and differences.

TOPIC B — "Lifestyles of Canadians in Other Times" delves into issues related to community life during the times of early settlers. The idea of meeting basic needs through a combination of cooperation and self-reliance is examined.

ELECTIVE B — "Old and New Methods" draws comparisons in terms of enjoyment, quality, quantity, cost and time.

ELECTIVE B — "Children in Early Alberta Communities" compares the activities and interests of children in previous generations to those of today.

TOPIC C — "Lifestyles in Culturally Distinctive Communities" introduces students to those groups wishing to perpetuate a unique way of life and the various influences working upon such groups.

ELECTIVE C — "Life in a Hutterite Colony" or "A Community Within a Community" or "Creative Arts in Culturally Distinctive Communities" can expand studies begun in Topic C.

HEALTH — the student

- identifies changes in the environment, such as snow, fog, rain, wind and fire, which affect safety.
- becomes aware of community recreation facilities.
- understands the need for nutritious foods and appreciates foods from other cultures.
- understands the importance of responsibilities and work roles in the home and the school.
- observes that people differ from one another in certain physical, intellectual and social characteristics.

SCIENCE — the student learns that

- humans use many natural resources (raw materials) in order to satisfy their needs and wants. Some of these are: coal, iron ore and lumber.
- heat, light, sound and electricity are common forms of energy.
- humans can exhibit behaviours that conserve energy in their environment.
- people gather together in communities for many reasons.
- there are many variations within the environment and the environment with its many elements is constantly changing.
- seeds have requirements for growth and are dispersed in many ways.
- animals and plants interact with one another and this interaction may result in the development of food chains and food webs.
- matter exists within the environment in three distinct forms: solid, liquid and gas, and may be changed from one form to another within the environment.
- In addition to locating by landmarks and reference points one can use distance and direction which may be determined by using a magnetic compass.
- the additional process skills of predicting and inferring are useful and necessary in the study of the environment.

MATHEMATICS — the student

- reads the Celsius thermometer to the one degree interval.
- classifies and identifies two-dimensional figures and three-dimensional objects.
- reads and writes basic common fractions and decimals in 10ths.
- reads and writes numerals to 9,999.
- extends estimation and measurement to include basic metric units.

LANGUAGE ARTS — the student

- speaks with fluency on complex subjects such as may emerge in environmental study.

observes that people differ from one another in certain physical, intellectual and social characteristics.

understands that growth patterns may be affected by heredity.

FINE ARTS

ART ELEMENT — the student

draws and paints subjects stimulated by films, recordings and visits within the environment.

does printmaking using plants and flowers.

understands and utilizes colours, textures and patterns in art projects.

does sculpture in ice and snow.

recognizes that art history may provide information as to how people and their societies, as well as their environments, may have changed and developed with the passage of time.

MUSIC ELEMENT — the student

recognizes that music history may provide information as to how people and their societies, as well as their environments, may have changed and developed with the passage of time.

recognizes that music styles change.

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

predicting, inferring and hypothesizing on the basis of study, and information and data gathered.

observing and classifying using increasingly complex criteria and property.

communicating using formal and informal language, both verbally and in written form, on more complex subjects and using a wider variety of information sources.

communicating using such art forms as drawing, painting, printmaking and sculpture while employing colour, texture and patterns.

measuring and estimating using metric units.

interviewing as a technique for gathering information leading to improved questioning techniques.

listening to prose, poetry and music to note changes in style, structure and content which have occurred over time.

understanding the basic function of muscles and bones.

understanding the body and the need for physical exercise.

developing and refining motor skills through activities such as hiking, skating, snowshoeing and cycling as well as rhythm and dance.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of students, such as:

the human body is precious, as is every form of life. Individuals should know about the body and its needs, as well as the environment in which it exists, in order to select the best alternatives for its care and keeping.

humans can exhibit behaviours which can conserve energy and other resources and if human beings protect the earth and the environment they will be able to continue to support a great diversity of living things.

people's needs and people's wants are not the same.

an individual's personal feelings and those of others should be considered before a decision for action is made.

speaks with fluency on complex subjects such as may emerge in environmental study.

obtains information and organizes material from a variety of more complex sources such as reference books, the dictionary, charts, maps, etc.

uses language effectively, in formal and informal ways.

demonstrates the ability to dramatize situations.

demonstrates skill in the interview technique.

PHYSICAL EDUCATION — the student

knows that the body is an environment of its own and that this "environment" is maintained by proper foods, ample rest and care, sensible clothing and suitable exercise. (Fitness Dimension)

refines basic orienteering skills using the directional compass. (Outdoor Pursuits Dimension)

understands the basic functions of the muscles and bones. (Fitness Dimension)

understands the relationship between types of exercise and extreme weather conditions. (Fitness Dimension)

reviews folk dances and practises new elements such as swinging and the schottische step. (Dance Dimension)

may be introduced to the skill of snowshoeing. (Outdoor Pursuits Dimension)

CASE STUDY

GRADE FOUR

Setting

Ms. N. Glish teaches Grade Four in an Alberta urban centre. Here is one of the largest elementary schools in the province with its 21 classrooms. Located in one of the newer subdivisions of the city, the school is trying to react to the expressed needs and concerns of a wide variety of parents, many of them new to the area.

Ms. Glish has been teaching for ten years and is, by training, an English major and a history minor. She is interested, personally, in the environment and is a member of the Alberta Field Naturalist Society and the Alberta Teachers' Association Specialist Council on Outdoor and Environmental Education.

The 29 students in Glish's class come from a variety of backgrounds. She is most anxious to bring a kind of unity to the group which she feels could be helped by working much of her teaching around a series of focal themes. She chooses to start in the area of environment.

Planning — Part One

Ms. Glish selected two **Themes** from the Grade Four section of the *Environmental Education Manual*. Concerned about human behaviour, she chose:

- *Human impact upon the environment may be either beneficial or harmful, or both. Advances in technology have positive and negative effects.*

and, since the students were, quite literally, in a new environment she elected:

- *Many living things have developed the capacity to adapt to their environment.*

Then, from the **Knowledge and Understandings** area she selected:

- *Technological advances have had a noticeable impact upon the environment and in some cases resource extraction and industrial development has resulted in severe damage to the land, air and water component of the environment;*
- *Adaptation is one of the keys to survival within the environment and living things adapt to their environment using a variety of natural and special abilities.*

From the **Skills, Abilities and Processes** section were chosen:

- *interpreting data which is gathered and expressed through such means as pictographs and bar graphs as well as in written form;*
- *inferring and/or predicting on the basis of past experience and on the basis of research and information/data gathered;*
- *planning for and anticipating the requirements of an out-of-school activity;*
- *demonstrating appropriate social and interpersonal behaviour for brief out-of-school investigations.*

The **Values and Attitudes** she wished to address were:

- *humans can be 'stewards' of the earth, rather than careless exploiters of it;*
- *people can learn to appreciate and enjoy the environment even as they investigate and study it.*

In order to bring this environmental education plan into line with the material in the regular subjects of her Grade Four program, Ms. N. Glish traced the connecting lines or arrows from her selections to particular subject strands. The strands would allow the development of the concept-objectives in an interdisciplinary manner. She noted connections with:

The **Science Strand**

- *when the effect on the resources of land, water and air is negative, the resulting conditions may be called pollution;*
- *excessive noise can be another type of pollution;*
- *the manner in which mankind extracts resources from the environment for the purpose of obtaining energy is important;*
- *living things have the capacity to adapt to the environment in many ways through such behaviour as camouflage, structural change, life cycle modifications, migration and hibernation.*

The **Social Studies Strand**

- *Topic A — "Alberta, Past, Present and Future: Our Natural Resources"*, and *Elective A — "Athabasca Tar Sands"*, both of which examine the uses of resources and environmental impact.

Ms. Glish noted that the **Skills, Abilities and Processes** she had identified for emphasis were supported by those in:

The **Fine Arts Strand**

- *improve skills in drawing, painting, sculpting and printmaking through motivation provided, in part, by tours.*

The **Mathematics Strand**

- *constructs and interprets pictographs and bar graphs.*

The **Language Arts Strand**

- *organizes information from a variety of sources and writes effective paragraphs.*

The **Health Strand**

- *recognizes appropriate safety practices at home, at school and within the community.*

Another health concept worth including was

- *takes pride in the school and its accomplishments by noting such things as the cleanliness of corridors, classrooms and playground areas.*

She would make sure by frequent mention and observation and by personal example, that the values and attitudes were addressed.

Planning — Part Two

Having made the necessary decisions in order to determine the themes, directions and content of her environmental education unit, Ms. Glish set about considering some of the resources she would find useful and helpful in her work. From the **Elementary Science Curriculum Guide** she identified:

Exploring Science — Houghton Mifflin — Unit 2 - Book 4
Unit 1 - Book 4
Unit 4 - Book 4

From the **Social Studies Curriculum Guide Supplement** she identified:

Alberta At Work — Alberta Heritage Project
"The Syncrude Project" and "The Sand Barrier" from Syncrude Canada Limited.

From the *Environmental Education Catalogue of Resources* she identified:

Lifeboat — a book by Ken Hewitt
From Nature to Man — a book by Bruce L. Barrett and John Stratton
The Environment and You — a good student reference book by Matthew J. Brennan.

She also planned to contact:

— Alberta Environment for "Environment Views" and other materials
— Outdoors Unlittered for their materials and films
— The Clean Calgary Committee for information on problems of the urban environment.

Out-of-School Activities

If the necessary cooperation was received from her principal and the parents of the students, Glish had plans for three out-of-school activities.

1. To the **Zoo** in order to discuss animal behaviour and adaptation, and to observe differing conditions and situations
2. To a **Provincial Park** in order to observe a more natural environment and have opportunity to appreciate the beauty that may be found there
3. To the city's **Sanitation Department or Waste Disposal Area** to observe the amount and variety of waste generated by people and industry

Actual activities during these tours would include:

a) interviewing the people in those places
b) sketching and drawing
c) photography

Afterward, students would be expected to prepare charts, graphs, reports and stories having to do with their study, and many opportunities could be found for creative writing in prose and poetry.

Hopefully the students would come to see how they themselves adapt to new situations within their experiences and how they can make a difference to the home and school environment.

GRADE FOUR

ENVIRONMENTAL FOCUS

THEMES

THEME: Human impact upon the environment may be either or both beneficial and harmful. Advances in technology have had positive and negative effects.

THEME: The needs or wants of people do not always remain the same. They have a tendency to change over time and as situations and conditions alter.

THEME: Many living things have developed the capacity to adapt to their environment.

THEME: Energy and other resources within the environment are in limited supply.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- Technological advances have had a noticeable impact upon the environment and in some cases resource extraction and industrial development have resulted in severe damage to the land, air and water components of the environment.
- The heavy use of raw materials and energy resources has resulted in a search for new or alternate sources.
- The environment is in a constant state of change which may be the result of either natural or man-made intervention and crises. Humans have developed a limited ability to predict certain types of environmental change and to exercise some control over the environment.
- Adaptation is one of the keys to survival within the environment, and living things adapt to their environment using a variety of natural and special abilities.
- Advances in technology and the accompanying resource requirements have resulted in a "shrinking world" where relationships and interdependencies occur between and among populations and nations.
- Technological advances and the development of new products can change the patterns of needs and wants in a society.
- The individual has influence within his or her portion of the environment and, together with others, may have either a beneficial or negative effect.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

- experimenting to expand the study of such environmental occupants as rocks and trees.
- inferring and/or predicting on the basis of past experience and on the basis of research and information/data gathering.
- observing relationships and manipulating variables.
- measuring accurately using a variety of tools and instruments.
- recording graphically, pictorially and in written form.

RELATED STRANDS

SOCIAL STUDIES — Topics include

- TOPIC A — "Alberta, Past, Present and Future: Our Natural Resources" notes that the meeting of human physical, economic and social needs is determined by the availability of natural resources. Renewable and non-renewable resources and their consumption or conservation are topics to be examined.
- ELECTIVE A — "Athabasca Tar Sands" expands upon the concept of developing and using a non-renewable resource. Present and future impacts upon the environment are examined.
- ELECTIVE A — "Alberta Hail Studies" looks at the capacity of people to actually control weather and benefit agriculture, for example.
- ELECTIVE A — "Ecotours" allows students to follow the major highways of the province (using roadmaps an[d] the *Relief Map of Alberta*) and study some of the flora and fauna and physical and human resources.
- TOPIC B — "Alberta, Past, Present and Future: Our Human Resources" deals with the people of the province and their handling of various problems (wars, depressions, etc.), throughout our history.
- TOPIC C — "Alberta's Links With Canada and the World" focuses on trade, tourism and transportation links as well as the production and exchange of goods which often utilize materials taken from the environment.
- ELECTIVE C — "Travel Links With the World" expands upon the idea of a 'shrinking world' through a study of selected vacation sites.
- ELECTIVE C — "Media Mania" discusses the huge impact of the various media upon our lives. They have the potential to provide information, formulate opinion and alter lifestyle.

HEALTH — the student

- accepts some responsibility for saving energy and the reduction and appropriate disposal of waste.
- understands that self-concept is determined by external (environmental) and internal forces.
- recognizes that one must interact and relate with the total environment for one's own protection. (Elective)
- identifies nutritious foods which provide essential substances to the body for growth and energy.
- recognizes that people must depend on other individuals, businesses, and communities for their basic needs.
- recognizes the effects of the individual's actions on other people.

RELATED STRANDS

SCIENCE — the student learns that

- the manner in which resources are extracted from the environment for the purpose of obtaining energy or producing goods is important.
- when the effects on the resources of land, water and air are negative the resulting conditions may be called pollution.
- excessive noise can be a type of pollution.
- energy exists in many forms (light, heat, chemical, nuclear) and may change from one form to another, which leads to the notion of energy transfers and energy chains.
- there are limits to currently available sources of energy.
- the fundamental resources of soil, land, air and water regularly and constantly change due to such factors as weather, the seasons, the water cycle, etc.
- studies of rocks and trees can be interesting and valuable.
- human beings have advanced to the point where they can make predictions about the environment including the effects of their own actions and events on nature, such as weather, floods, earthquakes and volcanoes.
- living things have the capacity to adapt to the environment in many ways through such behaviour as camouflage, structural change, life cycle modifications, migration and hibernation.
- the process skills of predicting, inferring and manipulating variables are important to science.

MATHEMATICS — the student

- uses the Celsius thermometer to measure body temperatures and temperatures in the environment.
- uses appropriate units of measurement.
- constructs and interprets pictographs and bar graphs.
- reads and writes decimals to hundredths.
- reads and writes time to minutes.

LANGUAGE ARTS — the student

- identifies feelings and attitudes expressed in speech or the written word.

recognizes the effects of the individual's actions on other people.

respects the feelings, rights, and property of others.

recognizes appropriate safety practices at home, at school and within the community.

takes pride in school and its accomplishments by noting such things as the cleanliness of corridors, classrooms and playground areas.

FINE ARTS

ART ELEMENT — the student

improves skills in drawing, painting, sculpting and printmaking through motivation provided in part by tours of exhibits, galleries, the city and community, and selected industries.

makes greater use, in art projects, of the colours, textures and patterns found throughout the environment.

MUSIC ELEMENT — the student

learns that the human voice is an instrument capable of changes in tonal qualities and expression.

identifies and compares sounds in the environment and learns that music can imitate these sounds.

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

recording graphically, pictorially and in written form.

interpreting data which is gathered and expressed through such means as pictographs and bar graphs as well as in written form.

reading at the appropriate level of vocabulary and number.

evaluating and discriminating among various sources of ideas and information.

communicating, both in writing and in speech, using appropriate language and style.

reading and interpreting charts and maps.

planning and anticipating the requirements of an out-of-school activity.

demonstrating appropriate social and interpersonal behaviour, for brief out-of-school excursions.

developing and refining motor skills through such activities as snowshoeing, cross-country skiing, swimming and aquatics as well as through rhythm and dance.

listening to identify and compare sounds.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

humans can be 'stewards' of the earth, rather than careless exploiters of it.

humans must develop a way of thinking and feeling about the earth if we are to be able to live harmoniously with each other and our environment.

opinions can often be swayed by messages presented through television, radio and other parts of the media so people must have the knowledge and wisdom to differentiate fact from fiction.

people can learn to appreciate and enjoy the environment even as they investigate and study it.

LANGUAGE ARTS — the student

identifies feelings and attitudes expressed in speech or the written word.

understands and evaluates material from a speaker or in printed form and can discriminate fact from opinion.

communicates effectively and utilizes appropriate language and style.

organizes information from a variety of sources and writes effective paragraphs.

PHYSICAL EDUCATION — the student

practises orienteering and map-reading skills. (Outdoor Pursuits Dimension)

plans ahead and selects and packs the necessary supplies and equipment for an out-of-school activity. (General)

erects shelters for the outdoors such as tents and lean-tos. (Outdoor Pursuits Dimension)

understands that body movement involves the interaction of muscles and bones. (Fitness Dimension)

experiences group sequences which show contrast and cooperation in square type dances such as the Virginia Reel. (Dance Dimension)

may be introduced to the activity and skills of cross-country skiing. (Outdoor Pursuits Dimension)

may, if facilities exist, enter into a formal program of swimming. (Aquatics Dimension)

CASE STUDY

GRADE FIVE

Setting

Mr. Cy Entist possesses a B.Sc. degree in biology as well as his B.Ed. degree. In addition to membership in the Alberta Teachers' Association Specialist Council in Science, he belongs to the Field Naturalist Society. Mr. Entist is responsible for a class of 30 students in Grade Five in a southern Alberta town. He is an amateur historian with a special interest in the period loosely described as the "opening of the West".

As a biologist, Cy has an acute awareness of many environmental problems. Until recently, however, he has tended to view these rather personally and from the scientific perspective only. The new *Environmental Education Manual For Grades I to XII* has a structure which points out other possibilities to him.

Planning — Part One

When Mr. Entist checked through the manual for his grade he noted that in the **Science** section of the related strands there were seven statements which had been selected as being involved with environmental education. Interested in pursuing the possibility of creating an interdisciplinary approach, he selected one statement as a starting point and proceeded to trace the connections illustrated on the page. His starting point statement was:

- *There is an aesthetic beauty to be found within the environment.*

By following a connecting line to the objective section of **Knowledge and Understandings** he located the statement:

- *There is an aesthetic beauty in the natural environment and some of this may be preserved by setting aside areas to be left in a wilderness or near-wilderness state.*

That statement, in turn, connected to the **Social Studies** portion where he read:

- *Elective A — "Preserving Our Wilderness" looks at the desirability of setting aside certain areas for the future. The problem of trading short-term economic gains for the possible depletion or ruination of our natural resources is a focal point for the study,*

and that was linked to the **Skills, Abilities and Processes** statement of:

- *problem-solving and decision-making on the basis of the discussions about environmental or social question and issues,*

which, in turn, could be traced to the **Fine Arts** section where the **Art Element** suggested:

- *demonstrates an awareness of the world through observation and experience and the ability to view carefully and critically.*

That statement led back to the environmental focus and noted:

- *evaluating, judging and generalizing about or from available information, data and material,*

which related to the **Language Arts** statement:

- *makes judgements, makes generalizations and evaluates ideas,*

and led full circle back to another statement in the **Science** area:

- *more sophisticated processes allow people to perform like scientists.*

His Alberta Education **Elementary Science Curriculum Guide** defined those processes for him.

Planning — Part Two

Cy decided to conduct an interdisciplinary environmental education unit "Preserving the Wilderness and Its Beauty". He decided to culminate his study with an overnight, two-day trip to the Brooks, Alberta area where the class could visit the Brooks Wildlife Centre, the Horticultural Research Centre, the Kinbrook Island Provincial Park, the Dinosaur Provincial Park, and stay at the Tillebrook Trans-Canada Campsite. He prepared a proposal for his principal, Mr. Boss, and for the superintendent and trustees, and obtained the necessary permission, subject, of course, to the approval and cooperation of the parents of his students. At a meeting of parents the proposal was approved and it was agreed that the trip would take place in early June.

Enthusiastic committees of parents were set up to deal with fund-raising, transportation and the acquisition of such items as tents and sleeping bags. Mr. Entist emphasized, however, that he wanted his students to do the necessary planning and preparation as well as engage in the pre-study, on-site study and post-study parts of the units he was presenting.

Pre-Study Activities

Committees of students, six of them, had assignments:

A. This group wrote to **Travel Alberta** (Tourism and Small Business), in order to obtain up-to-date road maps and information regarding the chosen sites in the Brooks area. They had to plan the best route, determine the distance and the time the trip would take and work out a travel-visit itinerary. They were to put their plans and material in a useful form and report back to the rest of the class.

B. This group contacted **Alberta Recreation and Parks** in order to get information on the department, on the concept of parks and reserved and preserved areas, and on the particular parks to be visited. These children were actually to prepare and present lessons on the subjects.

C. This group was to obtain information from **Alberta Energy and Natural Resources** in order to find out about such topics as land management and development in terms of past, present and future directions. The students, and those of Group D, were to report to the class.

D. This group was to contact **Alberta Environment** in order to find out about environmental assessment and land and water management.

E. This group was to get in touch with the **Town of Brooks,** Alberta, for the purpose of arranging to meet briefly the town's or county's local government and to learn about potential accommodation, police and medical services, etc., in the event of an emergency.

F. This group was to prepare a budget for the trip. They were to plan meals and estimate the probable costs of food, transportation and other identified needs.

Resources

In addition to the resources made available by the agencies contacted, Mr. Entist examined the *Environmental Education Catalogue of Resources* and managed to get hold of the following books:

Outdoors Canada from Reader's Digest Company
Back to Basics from Reader's Digest Company
Alberta by Sherman Hines

Mr. Cy Entist planned to emphasize, in his various classes, such things as:

- reading distances according to scale (mathematics);
- gaining, organizing and interpreting information and writing (with better quality) on a variety of subjects (language arts);
- movement skills involved in hiking, understanding the need for proper equipment and clothing, and orienteering skills (physical education);
- painting, drawing, pursuing themes of plants and animals, etc. (art).

On-Site Study Activities

The teacher was able to arrange for the park wardens or rangers to give a conducted tour of their regions to the students, and the people from the Wildlife Centre and the Horticultural Research Centre were equally cooperative.

Mr. Entist made sure that there was ample time and opportunity for the students to try to capture the "feelings" or "mood" of their experience through poetry development, drawing and sketching, and photography. Suitable songs were selected for "evening campfire" and one of his parent-volunteer supervisors could play the guitar.

Each student kept a trip journal or diary.

Post-Study Activities and Evaluation

The class put together a **Trip Scrapbook** into which went reports, poems and pictures as a record of all study activities. The principal, other staff and parents were invited to a **Report Evening** at which the student told of the ventures, read reports, stories and poems and displayed pictures and photos.

It should be noted that Mr. Cy Entist and other staff are considering a similar study approach which might focus on "Native Peoples: Their View of the Environment".

GRADE FIVE

ENVIRONMENTAL FOCUS

THEMES

THEME: The special abilities of human beings, which allow them to utilize and control much of the environment, should make them recognize their responsibility toward the care and maintenance of their environment.

THEME: With the recognition that the resources of the environment are in limited supply must come an understanding that it is necessary to reserve, preserve and conserve resources whenever and wherever possible.

THEME: Each individual of a species occupies a NICHE. A collection of a species is a POPULATION. Different populations within the same habitat form a COMMUNITY. Interacting communities of living and non-living things form an ECOSYSTEM. Any disturbance within the ecosystem has the potential to upset or alter the system and its delicate balance.

THEME: Humans once selected community sites on the basis of such factors as the availability of good water, good climate and good soil. Now development springs up around almost any required resource.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- Mankind, unlike most other living things, has developed the unusual ability to move to and live within a vast range of environments.
- Individual living things do not exist in isolation, rather they are part of a complex set of interrelationships and interdependencies.
- Early native peoples viewed the earth (environment) in a much different way than did the pioneer or than does the modern man.
- There is an aesthetic beauty in the natural environment and some of this may be preserved by setting aside areas to be left in a wilderness or near-wilderness state.
- Settlement and industry develops in a region due mainly to the availability of necessary resources.
- Man has learned a variety of strategies and behaviours which allow him to alter or modify his environment, and the environment may be changed in ways not planned or anticipated.
- Just as man has learned to alter his external environment by attempting to improve [illegible] by learned [illegible] by supplementing the natural defenses against diseases [illegible]

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

- observing with greater skill and sophistication using devices such as the microscope and telescope which extend the senses.
- classifying using more refined and complex criteria and properties.
- problem-solving and decision-making on the basis of the discussions about environmental or social questions and issues.
- evaluating, judging and generalizing about or from available information, data and material.

RELATED STRANDS

SOCIAL STUDIES — Topics include

- **TOPIC A** — "Canada: Exploration and Settlement" discusses the cooperation and competition which existed during specific historic episodes. The problems faced by the native people and by the early settlers are examined.
- **ELECTIVE A** — "Native Peoples of the Past and Survival" addresses the way in which native people used their environment to survive. Several native cultures can be investigated.
- **ELECTIVE A** — "Preserving Our Wilderness" looks at the desirability of setting aside certain areas for the future. The problem of trading short-term economic gains for the possible depletion or ruination of our natural resources is a focal point for the study.
- **TOPIC B** — "Canada: Industrial Development From Region to Region" looks at the impact of major industries on the people and the environment in the various regions of the country. Employment and resource availability and development and population are focuses of study.
- **ELECTIVE B** — "Acid Rain" looks at a specific type of pollution resulting from heavy industry. The study involves a thorough examination of the problems and consideration of possible solutions.
- **ELECTIVE B** — "Increasing the Yield At Any Cost" examines the pros and cons of new agricultural technology and the use of chemicals and pesticides. Potential impact on people and the environment is worthy of consideration.

HEALTH — the student

- accepts the differences among peers and classmates, i.e., physical, cultural, racial, religious as well as mental and physical ability and natural talents.
- appreciates that the social and physical environment influences feelings and attitudes. (Elective)
- identifies some of the secondary support systems available in the community.
- understands that clean air and water are important to one's health.
- realizes that the conservation of air and water depends upon many concerned people. (Elective)

SCIENCE — the student learns that

- from the ecological point of view, one of the oddest features of the human animal is the way he has been able to move into quite different environments and develop ecological niches in an area without substantial genetic or physiological adaptations. This has been possible due to man's ability to reason, his unique physical build, skill in fashioning coverings to protect himself from the environment, and to his technological development.
- human cultures have adapted to a vast range of earth conditions.
- each individual of a species occupies a NICHE. A collection of species is a POPULATION. Different populations within the same habitat form a COMMUNITY. Interacting communities of living and non-living things form an ECOSYSTEM.
- there is an aesthetic beauty to be found within the environment.
- living things survive when they adapt to changes in their environment.
- selected tools and instruments aid the scientist and the student.
- practice of the more sophisticated processes allows individuals to deal with science problems more effectively.

MATHEMATICS — the student

- constructs and interprets pictographs, bar graphs, line graphs and circle graphs.
- draws and constructs two-dimensional figures.
- finds perimeters and areas without formulae.
- reads distances according to scale.
- reads and writes time to seconds and reads the 24 hour clock.

LANGUAGE ARTS — the student

- makes judgments, makes generalizations and evaluates [illegible]ion.

identifies some of the secondary support systems available in the community.

understands that clean air and water are important to one's health.

realizes that the conservation of air and water depends upon many concerned people. (Elective)

recognizes that the body has natural and man-made defences against disease.

FINE ARTS

ART ELEMENT — the student

demonstrates an awareness of the world through observation and experience and the ability to view carefully and critically.

paints and draws using such environmental themes as animals, plants, night and day, machines, etc.

is able to blend items in order to create a collage or a montage.

MUSIC ELEMENT — the student

notes and recognizes distinctive rhythm patterns, melodic patterns, styles and harmonies which may illustrate and exemplify specific cultural traditions and styles.

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

classifying using more refined and complex criteria and properties.

problem-solving and decision-making on the basis of the discussions about environmental or social questions and issues.

evaluating, judging and generalizing about or from available information, data and material.

predicting, inferring and formulating hypotheses on the basis of experience and data gathered and with a means of testing.

measuring two-dimensional figures using appropriate units and formulae.

reading from a wide variety of literature with an expanded vocabulary of word and number.

communicating by gathering, organizing and interpreting information from a variety of sources and presenting it in written form.

communicating and recording information and impressions about the environment in various art forms.

listening in order to identify distinctive rhythms and patterns in music having cultural origin.

improving motor skills through such activities as skiing and aquatics as well as rhythm and dance.

demonstrating orienteering skills at an appropriate level.

selecting appropriate clothing or exercising in order to regulate body temperature.

planning for and behaving appropriately during a more extended out-of-school study.

demonstrating improved social and coping skills.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

human beings must develop an ecologically sound way of thinking, feeling and acting toward the earth in order to live harmoniously with each other and the environment.

each individual can do something positive to improve the environment.

people of the past worshipped and cooperated with the environment while people of today appear to be in conflict with the environment — we continue this conflict at our peril.

we should encourage the setting aside of reserves of natural wilderness areas for future generations of Albertans and Canadians.

reads and writes time to seconds and reads the 24 hour clock.

LANGUAGE ARTS — the student

makes judgments, makes generalizations and evaluates ideas.

reads widely and begins to select fiction and non-fiction materials having to do with the environment.

learns how to prepare a bibliography.

writes on a variety of subjects and demonstrates proofreading ability in providing a better quality of written work.

gathers, organizes and interprets information from a continually expanding variety of sources.

PHYSICAL EDUCATION — the student

develops and moves through group sequences which demonstrate cooperation and an understanding of contrasts in rhythm, such as are found in more complex square dances and national dances having unique melodies, styles and rhythms. (Dance Dimension)

engages in swimming and water safety studies and experiences, if facilities and equipment are available. (Aquatics Dimension)

improves the movement skills involved in hiking, skating, snowshoeing and cross-country skiing. (Fitness and Outdoor Pursuits Dimensions)

understands that people have different amounts of muscular strength and coordination. (Fitness Dimension)

practises more demanding orienteering skills. (Outdoor Pursuits Dimension)

understands the need for proper equipment and "layers" of clothing in order to survive in the environment. (Fitness and Outdoor Pursuits Dimensions)

demonstrates the necessary behaviour, social skills and general abilities to cope with longer out-of-school study experiences or "overnights". (General)

CASE STUDY

GRADE SIX

Setting

Mr. Phil O. Sophy is a teacher of a Grade Six class in a major urban centre in southern Alberta. The school is located in what might be described as a middle-income area. Phil's class consists of 31 children.

Although Mr. Sophy's area of specialty is social studies and history, he teaches all subjects except music to his class. Ms. P. Ano Player, teacher of Grade Five, teaches the music while Phil teaches physical education to her class.

In this city, all schools may apply to take part in the Elementary Outdoor School for Grade Six students. Phil's school has applied and been accepted. He knows quite a bit about the outdoor school and is aware that there must be cooperative teaching during the one-week experience at the site. That week, he knew, should be a part of a much larger unit of work.

Planning — Part One

Mr. Sophy's class was assigned a time period in early May at the Elementary Outdoor School. The "School" by the way, is located sixty miles west in the Alberta Foothills.

An examination of the *Environmental Education Manual for Grades I to XII* suggested to Mr. Sophy that he could, for this part of his year's work, focus on two **Themes.** These would be:

- *An ecosystem is made up of four major groups or organisms — the Producers, the Primary Consumers, the Higher Order Consumers, and the Decomposers. Man is a higher order consumer.*
- *By studying the many aspects of the environment, both past and present, mankind may be better able to cope with his situation in the future.*

Phil then selected several target objectives from the focus list recommended. From the **Knowledge and Understandings** section he chose:

- *An ecosystem is made up of four major groups of organisms . . .*
- *Throughout history all people have had the same basic need, and studies of other cultures, past and present, may result in a better understanding of people and how they satisfy their needs.*

The **Skills, Abilities and Processes** he wanted to stress were:

- *observing and making comparisons and developing conclusions based on observations made over time;*
- *classifying using a wide variety of criteria and properties to include creatures of a complex and composite structure;*
- *reading from a variety of sources, using contextual analysis and judging and evaluating ideas;*
- *planning for and behaving in an environmentally responsible way during an extended out-of-school experience.*

The **Values and Attitudes** selected for emphasis were:

- *by protecting the earth (environment) we may help it continue to meet the needs of all living things now and in the future;*
- *moving through the environment without a trace, wherever possible, is one example of environmentally responsible behaviour and attitude.*

The *Environmental Education Manual* identifies the interdisciplinary linkages between and among subjects. Phil decided to tie in the related strands of many subjects.

Elementary Science

- *Within the ecosystem there are four groups of organisms.*

Elementary Social Studies

- *Topic A: "How People in Earlier Times Met Their Needs", and*
- *Elective A: "Archeology".*

(Even though the civilizations being explored would be "ancient", Phil felt that a brief re-examination of the North American Indians and the pioneers would also be appropriate.)

Elementary Language Arts

- *understands most forms of language and communication and reads widely on a number of subjects including those involved with the environment;*
- *has skill in contextual analysis;*
- *has some skill in evaluating and judging ideas and values from a variety of sources.*

Elementary Art

- *maintains a sketchbook which is carried and used during tours . . .*

Elementary Physical Education

- *follows an orienteering course presented during either winter or warm weather;*
- *understands that muscles become exhausted and require them to rebuild energy;*
- *adopts the attitude and practice of "Camping Without A Trace".*

Planning — Part Two

Mr. Phil O. Sophy determined that during the weeks prior to departure for the Outdoor School he would:

a) teach the social studies unit on "Early Civilizations" focusing on Inca, Aztec and Mayan peoples and supplement with the material on archeology
b) support the social studies unit and give practice in out-of-school conduct by a tour of the Glenbow Museum
c) teach the science unit on the "Ecosystem" as recommended in *Exploring Science* Unit 6
d) present the material in the Mountain Habitat Films by Karvonen Films Limited
e) teach material on orienteering in his mathematics and physical education classes
f) make sure his students were physically fit and prepared; knew how to select and care for clothing and equipment for their tour; understood the need for carefully planned meals; and understood what was meant by camping without a trace
g) follow some of the activities suggested in the *SEEDS Energy Literacy Series*, Grade 6, such as "Preserving Food, Then and Now" (Activity 3), "Waste Not — Want Not" (Activity 7) and "Trying to Use Everything: Then" (Activity 10)
h) ask Ms. P. Ano Player to select some appropriate music and songs to go with the proposed activity

Resources

In addition to the resources already available to him, Mr. Sophy examined the *Environmental Education Catalogue of Resources* and arranged to obtain:

1. The *Project Learning Tree* materials through The American Forest Institute, Inc., 1619 Massachusetts Avenue, N.W., Washington, D.C. 20036
2. The book, *When the Wilderness Beckons* by Catherine Ross et al, Highway Book Shop, Cobalt, Ontario
3. The pamphlet, *Minimize Your Impact*, from Alberta Recreation and Parks
4. The book *Outdoors Canada*, from the Reader's Digest, 215 Redfern Avenue, Montreal, Quebec 1977
5. The book *Back To Basics*, from the Reader's Digest 1981
6. The book *Indian Legends of Canada* by Claude Melancon, Gage Publishing Limited, Toronto 1967
7. The book *Trails of a Wilderness Wanderer* by Andy Russell, Ballantine Books, Toronto, 1970
8. The book *Raven's Cry* by Christine Harris, McClelland and Stewart, Toronto, 1974
9. The book *Anthology of Children's Literature*, Edna Johnson, et al., Houghton-Mifflin Canada Limited
10. The book *The Corn Goddess and Other Tales from Indian Canada*, by Diamond Jenness, Information Canada, Ottawa, Ontario, K1A 059, 1975

Evaluation and Measurement

Phil decided to work on two types of evaluation for this project which was to involve the Elementary Outdoor School.

Type one would include an evaluation of the work of the students on a rather formal basis by preparing tests and quizzes on the instruction material during the pre-study, on-site study and post-study portions. Type two would be less formal and would consist of anecdotal records of children's reaction and behaviour; evidence of attitude modification as provided by teachers, students and parents; cursory examinations of sketchbooks and journals; and discussions of their prose and poetry (Haiku, Cinquain or Diamente, for example) contributions.

Mr. Sophy was reasonably certain that most, if not all, the program objectives would be met.

GRADE SIX

ENVIRONMENTAL FOCUS

THEMES

THEME: An ECOSYSTEM is made up of four major groups of organisms — the PRODUCERS, the PRIMARY CONSUMERS, the HIGHER ORDER CONSUMERS and the DECOMPOSERS. Man is a higher order consumer.

THEME: Man's constantly changing and growing need for resources and energy have resulted in:
a) competition for scarce resources;
b) the search for resources in unexplored areas;
c) the search for energy-source alternatives; and
d) a system of "trade-offs" being developed.

THEME: Almost all living things are equipped with certain instincts and self-regulating mechanisms. Man does not seem to possess these.

THEME: By studying the many aspects of the environment, both past and present, mankind may be better able to cope with his situation in the future.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- An ecosystem is made up of four major groups of organisms: the Producers, the Primary Consumers, the Higher-Order Consumers and the Decomposers. Man qualifies as the most significant of all consumers.
- Our earth is a part of the Solar System and man's insatiable curiosity and technological capacity has moved him to study and explore, not only his earth-bound environment, but the regions of outerspace.
- Throughout history all people have had the same basic need and studies of other cultures, past and present, may result in a better understanding of people and how they satisfy their needs.
- Man has attempted to master his environment and, to an extent, he has succeeded in that he has access to virtually all parts of the earth and is able to move on or under bodies of water and to travel on or over all parts of the planet.
- Human needs may be met through mutual cooperation and support.
- Fossil fuels, such as are found in Alberta, are a primary source of energy but, since these are in limited supply, energy alternatives, some of which may be dangerous to man and the environment, are being sought.
- Group decisions, resulting in some "future plan" may be beneficial to the individual and the group.
- Increasing populations with their demands and needs lead to a scarcity of resources which may result in a system of "trade-offs" and competition for the things that sustain life.
- Personal surroundings (environments) can be examined and altered or improved.
- Living creatures (animals) grow through various stages.
- Human characteristics are inherited or acquired and can be affected by numerous factors.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

RELATED STRANDS

SOCIAL STUDIES — Topics include

- **TOPIC A** — "How People in Earlier Times Met Their Needs" examines ancient Mediterranean or Pre-Columbian civilizations. The ways in which these peoples used their environment to meet basic needs are a part of the study.
- **ELECTIVE A** — "Archeology" further introduces the students to the processes by which earlier civilizations may be studied. Research and field study at locations like zoos and museums are encouraged.
- **TOPIC B** — "How People in Eastern Societies Meet Their Needs Today" addresses the similarities and differences between those societies and our own. The effect of the physical environment on the satisfaction of needs as well as the influence of customs and traditions should be subjects of study.
- **ELECTIVE B** — "World Communities" provides another study opportunity to examine how people in other lands meet their needs. The effect of the environment on the peoples selected for study is a prime consideration.
- **TOPIC C** — "Meeting Needs Through Local, Provincial and Federal Government" focuses on the realization that human needs are often best achieved through mutual cooperation and support. Specific samples or cases should be examined.
- **ELECTIVE C** — "Trade-offs" allows students to examine the processes of decision-making to resolve problems related to scarcity, increasing productivity and the role of government in the economy.

HEALTH — the student

- understands that there are factors which influence food choices, such as cultural influences, beliefs, activities and environmental influences.
- learns to recognize basic values.
- recognizes that many organizations are necessary to maintain or enhance sanitary conditions and to protect the environment.
- assesses the home for safety hazards and formulates a plan (with parents) for reducing identified hazards.
- understands the six stages of human development: pre-natal; infancy; childhood; pre-adolescence; adolescence; and adulthood.
- learns the basic differences between inherited and acquired characteristics.

RELATED STRANDS

SCIENCE — the student learns that

- within an ecosystem there are four major groups of organisms which are the producers, the primary consumers, the higher-order consumers and the decomposers.
- the planet Earth, as we know it, is a part of the Solar System and man's insatiable curiosity and technological capacity has moved him to study and explore, not only his earthbound environment, but the regions of outer space.
- in some ways humans have mastered the environment since technology has allowed them access to virtually all parts of the earth, to move on and under the bodies of water and, finally, to fly over and to all parts of the planet.
- although fossil fuels such as those found in Alberta (coal, oil, natural gas) constitute a major source of energy, alternative sources (solar, wind, biomass, thermal, nuclear) do exist, however there are advantages, disadvantages, problems, costs and risks associated with all energy resources.
- man's treatment of the environment as a source of materials, plus his ignorance of its limits, have resulted in numerous problems which require solutions in order to preserve and improve the quality of the environment.
- populations compete for the things they require to sustain life and, under normal circumstances, populations are self-limiting, based on the availability of food and space.
- society must examine the "trade-offs" that are a part of our energy consumption lifestyle since the future is, in large part, determined by actions in the present.
- more sophisticated processes and their practice improve scientific skills and abilities.

MATHEMATICS — the student

- calculates averages and percentages.
- finds perimeters and areas with and without formulae.
- reads and draws diagrams according to scale.

LANGUAGE ARTS — the student

- understands most forms of language and communication and reads widely on a number of subjects including those involved with the environment.

understands the six stages of human development: pre-natal; infancy; childhood; pre-adolescence; adolescence; and adulthood.

learns the basic differences between inherited and acquired characteristics.

develops problem solving and decision-making skills.

FINE ARTS

ART ELEMENT — the student

maintains a sketchbook which is carried and used during tours to theatres, galleries, zoos and museums.

may participate in field study tours for the purpose of examining the history of art and architecture as well as the effects of plays, movies, advertising and other influences upon art.

may become involved in an extensive project focussing on town planning which could explore a variety of dimensions including transportation routes, residential locations, business and industry locations, school locations and the need for parks and playgrounds and green spaces.

MUSIC ELEMENT — the student

recognizes that music often reflects the feelings of people about culture and beliefs, country, seasons and holidays.

learns that people have created instruments to express their music and many of these are the result of technological advances. (Students might go to see a synthesizer, for example.)

NOTE: The proposed Elementary Drama Program will provide a number of linkages which relate to environmental education.

numerous factors.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

observing and making comparisons and developing reasonable conclusions based on observations made over time.

classifying using a wide variety of criteria and properties to include creatures of a complex and composite structure.

predicting, inferring and formulating hypotheses using a variety of strategies including interpolation and extrapolation.

measuring, using appropriate units and formulae, for two-dimensional and three-dimensional figures.

recording data and information graphically and pictorially.

making decisions and choices in the context of responsible action.

reading from a variety of sources, using contextual analysis and judging and evaluating ideas.

speaking and writing fluently on a variety of complex and abstract subjects.

planning for and behaving in an environmentally responsible manner during an extended out-of-school experience.

understanding and demonstrating the skills of outdoor living that are sensitive to the environment.

listening and being aware of how prose, poetry and music reflect the feelings of people.

demonstrating appropriate skill with skates, snowshoes or skis, or those required in aquatic activities.

showing some mastery of orienteering skills.

understanding physical limits and fatigue.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

working together with people of similar interests and concerns can often be more effective in influencing environmental decisions than individuals working alone.

by protecting the earth (environment) we may help it continue to meet the needs of all living things now and in the future.

because we have become a "Throw Away" society, greater efforts should be made to "Reduce, Reuse and Recycle".

moving through the environment without a trace, wherever possible, is one example of environmentally responsible behaviour and attitude.

reads and draws diagrams according to scale.

LANGUAGE ARTS — the student

understands most forms of language and communication and reads widely on a number of subjects including those involved with the environment.

demonstrates skill in contextual analysis.

demonstrates some skill in evaluating and judging ideas and values from a variety of sources.

speaks fluently about and writes three or four well organized paragraphs about more abstract and complex subjects.

PHYSICAL EDUCATION — the student

plans a reasonable menu and prepares food for up to nine meals. (Outdoor Pursuits Dimension)

adopts the attitude and practice of "Camping Without a Trace". (General and Outdoor Pursuits Dimension)

develops additional movements and combinations of time and force to produce rhythms; more complex square dances and round dances are novelty steps. (Dance Dimension)

may, if proper equipment, instruction and environment are available, engage in introductory canoeing activities. (Aquatics Dimension)

follows an orienteering course presented during either winter (snowshoeing or cross-country skiing) or warm weather (hiking). (Orienteering and Outdoor Pursuits Dimensions)

understands that muscles become exhausted and require time to rebuild energy. (Fitness Dimension)

CASE STUDY

GRADE SEVEN

Setting

Mrs. Artzen Craftz is a teacher of health and art in a ten-room junior high school in north-central Alberta. She is also the teacher-sponsor for the school's yearbook, newspaper and photography club. Photography is also one of the "B" option or lifetime activities offerings.

In Mrs. Craftz' opinion, the school is a nearly perfect size. She is able to know most of the students quite well and there is a strong spirit of friendship and cooperation among the staff. This atmosphere is due, in large part, to the principal, Mr. Chieftain, who runs a "tight" school but is very approachable, and is supportive of his staff and their efforts. He prides himself on being flexible and encourages all the teachers to be the same way.

Mrs. Craftz is prepared to offer a proposal whereby, for at least a portion of the school year, the school works on an environmental education theme operated on interdisciplinary lines.In order to structure her proposal, she refers to the Grade Seven section of the *Environmental Education Manual For Grades I to XII.*

Planning — Part One

Logically, Artzen begins her planning with the subject areas for which she is responsible. Under the **Related Strands** column she examines the Art Element and identifies:

The Environmental Studies Module which should examine the impact of various forces and media which shape our environment and promote discussion on ways in which tomorrow's society might cope with environmental problems.

The Communication Arts Module which includes:

a) experiments with colour for readability and impact
b) projects in poster-making, school newspapers, signs and symbols for specific events
c) visual projects involving photos, slides and/or film about a particular topic of interest

From this starting point she traces the linking lines or connectors to the central column of **Environmental Focus.** One arrow led to the statement:

- *The physical environment influences specific aspects of a culture such as the ways in which basic needs are met.*

Another led to the **Skills, Abilities and Processes** segment which read:

- *recording and illustrating using photographs and slides, posters and charts in such creative projects as advertisements, newspapers and editorials;* and
- *experimenting with colour for readability and impact.*

By continuing the tracking or tracing exercise from these objectives, Mrs. Craftz is able to locate related or articulating concepts or content in other subject area strands. For example:

Social Studies

- *Topic B — "Case Studies of Non-Industrial Societies";*
- *Elective B — "Impact of Environment on Culture".*

Science

- *Mankind's influence may increase the rate of change, with beneficial or harmful results to the environment (Elective).*

Language Arts

- *Through the Research, Study and Composition component, the student locates and uses a variety of information, illustrates ideas using pictures and posters, and plots information on graphs and charts.*

Artzen followed the connectors back into the central column where she found:

- *MAN seems to be the ultimate adapter and high-order consumer as he influences the environment to meet his needs, uses huge amounts of resources and energy, and exhibits behaviours which can endanger the stability of the environment;*
- *graphing to include projections — line graphs, etc.,*

and these gave her access to the **Mathematics** section:

- *Constructs, reads, interprets and applies information from pictographs and line, bar and circle graphs. There is an introduction to interpolation and extrapolation.*

and, again, to the **Science Strand:**

- *Elective — Mankind commands the use of a great supply of energy to change the environment to his liking;*
- *Elective — Mankind's influence may increase the rate of change, with beneficial or harmful results to the environment;*
- *Elective — Pollution, due to mankind's production and use of energy, can be minimized;*
- *Elective — The preservation of mankind's biological resources depends on the awareness and positive action of each individual.*

Mrs. Craftz decided to approach other teachers on the staff to find out more about what they were actually planning to teach. After an impromptu meeting in the staffroom she went on to do some more planning.

Planning — Part Two

Armed with this information on the number of integrative possibilities within the Grade Seven curricula (Grades Eight and Nine could be included at some future time) she proceeded to develop a project on the subject "Conservation in Our School, Our Town, Our Time".

Part of her project would be similar to that conducted by St. Paul Elementary School, which managed to cut its yearly power consumption by fifty percent, and the "Fifty School Project" sponsored by Alberta Energy and Natural Resources. She wanted, however, a "broad front" approach which explored as many avenues as possible.

The project might include:

a) an examination of the town's water supply and amounts of consumption
b) an examination of air quality
c) an examination of the agricultural use of chemical fertilizers and pesticides
d) an examination of energy (electrical power and natural gas consumption)
e) an examination of industry
f) an examination of sewage and waste disposal
g) an examination of recycling possibilities

Material and information might be obtained from such sources as:

1. Alberta Agriculture
2. Alberta Environment
3. Alberta Energy and Natural Resources
4. Alberta Consumer and Corporate Affairs
5. Environment Council of Alberta
6. Outdoors Unlittered
7. Alberta Power and Trans-Alta Utilities
8. Canadian Western Natural Gas
9. The SEEDS Energy Program

Mrs. Craftz could see numerous opportunities for student involvement. They could:

a) write letters requesting information and answers to particular questions
b) interview people in government, business and industry
c) research and report on various topics and issues
d) conduct opinion polls among students and parents
e) photograph and draw examples of good and bad environmental situations in the community
f) graph and record data collected in investigations or exercises such as rates of power, water or gas usage
g) develop posters to advertise such projects as "Clean School Week" or "Clean Town Week"
h) prepare columns and editorials for the school paper which would report or opine on a variety of topics
i) express ideas and concerns through creative projects in art and literature

Other activities could include:

- simulation studies (SEEDS, Project Learning Tree, Minnesota Department of Education), or
- the Energy Van Program of the Alberta Department of Energy and Natural Resources

Mrs. Artzen Craftz realized that for an activity such as this environmental education project to be successful it would require the support of staff, the principal, and the superintendent. She also knew that some of the investigations might lead into controversial and unpopular issues. She would have to keep in mind that system of "trade-offs" (as examined in Grade Six Social Studies Elective) must be considered.

GRADE SEVEN

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC B — "Case Studies of Non-Industrial Societies" allows the students to become aware of limitations of a single cultural perspective. The cultures examined are somewhat primitive. The relationship between the natural environment and the culture catches needs to be focused upon. The harmful effect of cultural contact between the advanced cultures is also recognized.

ELECTIVE B — "Impact of Environment On Culture" examines aspects of culture influenced by the physical environment such as the ways basic needs are satisfied. The differences in the type of shelter and clothing are topic samples.

TOPIC C — "Canada — A Multicultural Society" discusses topics such as the need for adaptive behaviour when people migrate from one country to another or one area to another.

ELECTIVE C — "Multi Cultural ... and the Food We Eat" suggests that likes and dislikes of certain foods may be formed by cultural preference. Field work to various restaurants and shopping studies are recommended. The home economics staff could be included.

HEALTH — the student learns that

since man relies upon the environment for his survival he has a need and responsibility to see to its preservation and maintenance, not only for himself, but for future generations.

human activities produce waste and pollution of many kinds and these may affect people and other living things.

several voluntary and public agencies have been created for the purpose of protecting and enhancing the environment, and that it is possible for interested people, students included, to become involved in sponsored worthwhile projects.

people have special nutritional needs during adolescence.

good nutrition can enhance appearance, personality and physical well being.

it is possible to differentiate between hereditary and environmental characteristics.

groups are formed on the basis of common characteristics, and the smaller the group the greater are the number of common characteristics.

HOME ECONOMICS

* Sample material could include

KNOWING ME — KNOWING YOU — the student

becomes aware of media as a potential source of opinion formation and biased ideas.

LEISURE CRAFTS — the student

knows that the selection of a hobby or leisure craft will be on the basis of interest or coordination and skill.

INDUSTRIAL EDUCATION

* Sample material could include

SMALL ENGINES — the student

ENVIRONMENTAL FOCUS

THEMES

1. The environment, or the biosphere, sustains life. It is where groups of organisms or ecosystems are formed.
2. An interdependence exists between all living things and their environment.
3. Living things must adapt to their environment.
4. Man is a high order consumer who utilizes the environment to meet his needs and who may influence the environment either positively or negatively.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

Non-industrial nations relate to the environment much differently than do industrial nations.

The physical environment influences specific aspects of a culture such as the ways in which basic needs are met.

Man seems to be the ultimate adapter and high order consumer as he influences the environment to meet his needs, uses huge amounts of resources and energy, and exhibits behaviours which can endanger the stability of the environment.

Various organisms must adapt to the environment but may do so in a wide variety of ways, and all organisms require nutrients for energy and life.

Cultural influences may have an impact on the way groups or individuals may wish to live.

Food needs and selections will be influenced by factors in the environment, culture, age, and stage of life.

Life on our planet exists within the biosphere where ecosystems are formed of communities of organisms.

All living things possess certain characteristics, some as a result of heredity and some as a result of environmental influences.

Living things may be classified as protist, plant or animal.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

problem-solving, not only on the basis of the interpretation of data, but through the use and manipulation of measuring tools.

graphing to include projections — line graphs, etc.

applying language skills in all subject areas.

writing mathematical sentences for English sentences.

calculating the areas and perimeters of various polygons both with and without formulae.

RELATED STRANDS

SCIENCE — the student becomes aware that much of the content of life science focusses on the environment, and learns that

ELECTIVE — Mankind commands the use of a great supply of energy to change the environment to his liking.

ELECTIVE — Mankind's influence may increase the rate of change, with beneficial or harmful results to the environment.

ELECTIVE — Pollution, due to mankind's production and use of energy, can be minimized.

ELECTIVE — The preservation of mankind's biological resources depends on the awareness and positive action of each individual.

life on our planet is possible in the BIOSPHERE, where:
- living and non-living things interact within ecosystems
- communities of organisms exist within the ecosystem
- members of each community show adaptations which are necessary for the survival of the community, and changes or adaptations may take place over an extended period of time
- some organisms are specific to a certain community while others may exist in more than one community
- an organism is the product of both heredity and environment
- nature constantly recycles materials, and
- the environment and the distribution of organisms are in a state of continual change.

organisms react to their internal and external environment
- different species may have different ways of receiving and responding to stimuli
- organisms differ in their adaptation to their environment

organisms require nutrients for energy
- green plants use the sun's energy to produce food
- energy from stored food is usable when organisms break food down into nutrients
- organisms obtain food in a variety of ways

within large groups, members share some common characteristics. Within smaller groups or sub-groups, members share a greater number of common characteristics.

living things may be classified as protist, plant or animal.

more sophisticated processes allow people to perform like scientists.

MATHEMATICS — the student

solves problems using a variety of measuring instruments such as rulers, scales.

constructs, reads, interprets and applies information from pictographs and line, bar and circle graphs. There is an introduction to interpolation and extrapolation.

writes mathematical sentences for English sentences.

constructs and calculates areas and perimeters of such polygons as triangles and rectangles.

solves word problems involving decimals, involving ratio and percentage, using basic skills.

LANGUAGE ARTS — the student

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SMALL ENGINES — the student

can explain some of the effects on the ecology of the gases and wastes produced by the internal combustion engine. (Page 26)

FINE ARTS

ART ELEMENT — the student

has a number of "modules" available for consideration. Although any of the modules could be presented, our suggestion would be:

1. **Communication Arts** including
   a) experiments with colour for readability and impact
   b) projects in poster-making, school newspapers, signs and symbols for specific events
   c) visual projects involving photos, slides and/or film about a particular topic of interest

2. **Graphic Arts** including
   a) the relief process using natural objects like leaves, bark, mosses and pebbles, as well as using similar materials for inking and printing
   b) the planographic process involving rubbings made with pencils, crayons or ink and brayer, from natural objects found in the environment

3. **Environmental Studies** — which should examine the impact of various forces and media that shape our environment, and promote discussion on ways in which tomorrow's society might cope with environmental problems.

MUSIC ELEMENT

The music program is in the process of upgrading and modification. Integrative possibilities will become readily evident.

BUSINESS EDUCATION

COMMUNICATIONS — the student will

be introduced to the many other forms of communication such as
- conventions
- trade fairs
- meetings
- seminars
- face-to-face communications

* Further listings in Appendix

writing mathematical sentences for English sentences

calculating the areas and perimeters of various polygons both with and without formulae

problem-solving involving decimals, ratio and percentage and using basic mathematic skills

experimenting with colour for readability and impact

recording and illustrating using photographs and slides, posters and charts in such creative projects as advertisements, newspapers and editorials

communicating through a variety of means including types of animal communication, e.g., inarticulate utterings.

writing, speaking and listening with greater proficiency

displaying sensitivity toward expressed attitudes and values.

understanding how technological advances have effected changes in ways of thinking and expressing ideas.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

one should be sensitive to and aware of the values and attitudes of others.

technological advances have affected changes in ways of thinking and expressing ideas.

several volunteer and public agencies have been formed for the purpose of protecting and enhancing the environment, and interested and concerned citizens, including students, may become involved in worthwhile projects.

the earth's resources exist for all living things, not just people.

solves word problems involving decimals, involving ratio and percentage, using basic skills.

LANGUAGE ARTS — the student

through the Research Study and Composition component,
- locates and uses a variety of information
- illustrates ideas using pictures and posters
- plots information on graphs and charts

applies language arts skills in all subject areas.

demonstrates increasing proficiency in oral and written language.

identifies and describes different kinds of communication including animal communication (inarticulate utterings).

practises the skills of listening and speaking through such activities as discussions.

through the Expressed Thought and Values components,
- identifies and is aware that attitudes and values are expressed in literature, and that these change
- learns that technological advances have affected changes in expressed thought

PHYSICAL EDUCATION

NOTE: The Physical Education Program is in the process of upgrading and modification. Integrative possibilities, particularly with the elements of rhythm and dance, aquatics, and outdoor pursuits, will become readily evident.

CASE STUDY
GRADE EIGHT

Setting

Ms. Irtha Waterlund is an enthusiastic, dedicated teacher of science. She sincerely cares about her students and is very interested in curriculum development as it reflects and responds to the needs of students.

Ms. Waterlund's training and teaching experience in England was strongly directed toward environmental education. Her teaching service in schools in British Columbia and Alberta has provided a balanced understanding of the Canadian educational scene. She is able to bring to her school a strong background in the fundamentals of science as well as the adaptability and flexibility developed while initiating and testing a variety of innovative programs. Currently, she is in her second year of teaching at a large junior high school of 700 students in south-central Alberta.

Irtha's love for the outdoors is evinced by her active participation in hiking, snowshoeing and canoeing activities. She sits on the executive of the Alberta Teachers' Association Specialist Council for Science. As a single parent, Irtha is working to blend her profession and her love of the outdoors with the raising of two elementary school-age children.

The school utilizes a team teaching approach whereby the teachers work together and present material to all the students in a grade (also in the school). The school is located in a relatively affluent area of the city, but also serves students from adjacent lower socio-economic areas.

Like several other schools in the system, Dime School has raised money for the purchase and maintenance of a school bus and a third of the staff is licenced to drive the vehicle. There is an excellent level of rapport and cooperation among the staff, and most of the teachers, together with the principal, Ms. Dee Siplin, support the concept of incorporating out-of-school studies into the overall program. It has, for example, become a tradition for the Grade Eight classes to have a three-day field/camping experience in late October.

Irtha finds the new *Environmental Education Manual* a very valuable document. It supports the opinion of herself and her colleagues regarding the importance of the interdisciplinary teaching, and outlines and defends the worth and credibility of field trips and out-of-school study.

Planning — Part One

Ms. Waterlund and the rest of her team agree to try to apply the interdisciplinary recommendations of the manual during their planning for the next Grade Eight science program year.

Irtha, as has been the practice, will represent the science team for the field trip and will work with selected members of other subject teams. These include Talla Storey, of the language arts team, and Jim Nastix of the physical education and health team, both of whom have participated in previous years. A new teacher in the school, Al Jeebra, will represent the mathematics team.

This particular grouping of teachers was elected because Irtha's students all take their language arts from Talla and their math from Al. Jim's situation is a bit more complex but he feels quite comfortable in asking other teachers to cover his classes during the three-day period since he is fully prepared to return the favour when others of his group are similarly involved.

The selection of October as the time for the activity was not accidental. Grade Eight is considered by many to be one of the more 'difficult' years for both students and teachers. Such an experience could do much to aid in the social development of students struggling with adolescence and pu[illegible]nd, in many cases, provide a spark of interest and enthusiasm toward the tea[illegible]and the school.

Discussion Sessions

The group elects to use, as its starting point, the material that is provided in the *Environmental Education Manual* for Grade Eight. This early in the year, they reason, some Grade Seven topics of learning might also be included as a review and as a lead-up to topics to be dealt with in Grade Eight science. The teachers realize that although they could try to fit everything in, they would be better to set a reasonable base and expand from there, if necessary. They actually photocopied the pages of material from the manual and used a "cut and paste" method for charting their three-day program rationale. (See Diagram #1)

It was decided that they should approach other staff members and enlist their cooperation in providing additional input for the plan or by offering special guest lectures to the student groups. Sheila Baker, from home economics, was asked about menus and food preparation. Claude Hammer, of industrial arts, was asked to discuss concepts on resource usage. Paige Charters was invited to share her social studies approach on decision-making. (**NOTE:** In Dime School both home economics and industrial arts are co-education courses.)

Planning — Part Two

The teaching team chose as the actual site for their program one of the group camps in the Bow-Crow Forest Reserve. The site provided individual tent sites for two to six-person tents, cooking shelters and a wood supply provided by the reserve administration, and a type of communal building with a fireplace. The location was within convenient distance of a logging camp and the town of Exshaw, Alberta.

The team visited the camp on a Saturday and, after assessing the teachable resources of the facility, were able to set out a program timetable of activities. (See Diagram #2)

The principal, Ms. Dee Siplin, approved their planning and arranged the necessary central office approval, insurance and equipment bookings. Students were expected to provide their own tents, personal equipment, clothing and food. Funding for the activity came from school resources supported by a modest per-student fee. Students who were unable to pay were appropriately subsidized. Some of the funds were allocated to providing one substitute teacher for each of the three days, with the rest of the school staff cooperating in covering classes. Ms. Siplin herself volunteered to take on a teaching load in order to assist the project. Efforts were made to schedule on-site activities in such a way as to permit the supervising teachers to have some unassigned time. Several plans for alternate activities, to be used in case of emergency or inclement weather conditions, were brought forward.

A final organization meeting, held just prior to departure, indicated that preparations were complete and that all reasonable and predictable eventualities had been considered.

Conclusion

Upon their return from the activity, staff and students were able to report that everything had gone well. Feedback from the parents of the participants was so positive as to encourage the continuation of programs of this type in Dime School. Follow-up discussion indicated that the objectives of the project had been met.

DIAGRAM #1

GRADE EIGHT: THEMES

2. Societal and personal expectations regarding quality of life determine in part resource use. Resource use is also influenced by human decisions and actions that may be political, economic, geographic, cultural or social in their origin.
3. The processing of natural resources may result in positive or negative effects. Production by-products, for example, may have unanticipated short term impact.
4. The earth's atmosphere and the conditions within it sustain and affect the human condition.

KNOWLEDGE AND UNDERSTANDINGS

- The atmosphere is heated by the sun's energy.
- The air in the atmosphere is in constant motion due to the earth's revolution and rotation and to unequal heating and these factors create various local conditions which are called weather.
- Man has advanced technologically to the point where he is able to make some measurements and predictions about the weather and, in some instances, control it.
- The crust, or surface, of the earth is constantly being changed by numerous factors or influences.
- The crust of the earth may be studied to reveal some of the "secrets" of the past.
- Individual and collective human needs or wants may have to be regulated by established "institutions" and conflict may result.

SKILLS, ABILITIES AND PROCESSES

- displaying good interpersonal skills in group projects and in out-of-school study activities.
- solving problems using appropriate skills including those of mathematics.
- measuring, using more sophisticated apparatus.
- speaking and writing to compare, explain, interpret or persuade.

VALUES AND ATTITUDES

- each individual should develop a value system which takes into account the values and attitudes of others.
- decisions in all areas, particularly the environment, which are not carefully thought through may have unwanted results.

IDEA AND ACTIVITY MATCH

SCIENCE STRAND

- **ASTRONOMY** — using a telescope and binoculars — observing the constellations
- **METEOROLOGY** — cloud formations, wind direction and speed, air pressure, weather maps, land and field work, predicting
- **GEOLOGY** — strata and crustal formations, faulting, weathering and erosion, water cycle
- **ECOLOGY** — living and non-living things, ecosystem, interaction, adaptation, distribution, etc., as to earth's crust

SOCIAL STUDIES STRAND

- **TOPIC AND ELECTIVE 8** — decision-making, environmental impact

FINE ARTS STRAND

- **ART** — sketching, rubbings, collage
- **DRAMA** — mime, story-telling
- **MUSIC** — mood and campfire songs

PHYSICAL EDUCATION AND HEALTH STRAND

- First Aid — safety — orienteering — keep fit — proper clothing and equipment — woodcraft — teamwork and social growth — organization and planning.

- **HOME ECONOMICS STRAND**

  Proper clothing, menu planning, food preparation.

- **MATHEMATICS STRAND**

  Orienteering problem solving (distance — food — costs)

- **LANGUAGE ARTS STRAND**

  Oral and written language, expressing of thoughts and values (solo time, forms of poetry, journals, reports, etc.)

- **INDUSTRIAL EDUCATION STRAND**

  The effective use of resources, a mini-field trip to a lumber camp and the Essbaw Cement Plant

DIAGRAM #2

LESSON PLAN FOR FIELD TRIP		
MONDAY	**TUESDAY**	**WEDNESDAY**
MORNING Journey to campsite En route questionnaire activity – industry – geological formations – flora and fauna Arrive at the site — Pitch Camp Brown-Bag Lunch	**MORNING** Breakfast Group Study A = Man-Environment Impact Study (M) B = Ecology Study (N) C = Orienteering Study (J) D = Geology/Weather Study (W) Lunch (Solo time students and teacher)	**MORNING** Breakfast Group Study A = Orienteering Study (J) B = Geology/Weather Study (W) C = Man-Environment Impact Study (M) D = Ecology Study (N) Lunch (Solo time students and teachers)
AFTERNOON **Group Study** A = Ecology Study (N) B = Orienteering Study (J) C = Geology/Weather Study (W) D = Man-Environment Impact Study (S) Solo time students and teachers	**AFTERNOON** **Group Study** A = Geology/Weather Study (W) B = Man-Environment Impact Study (S) C = Ecology Study (N) D = Orienteering Study (J) Solo time students and teachers	**AFTERNOON** **Team Competition** Compass/Orienteering A D C B Camouflage Game B A D C Scavenger Hunt C B A D Sardines Game D C B A Journal and Diary Write-up Break Camp
EVENING Supper — Free Time Campfire — Sing Song — Story Telling **Group Study** A & B = Astronomy (W & J) C & D = Night Walk-Poetry Work (S & N) Late Night Hot Drink and Snack	**EVENING** Supper — Free Time Campfire — Sing Song — Story Telling **Group Study** A & B = Night Walk/Poetry Work (S & N) C & D = Astronomy (W & J) Late Night Hot Drink and Snack	**COMPLETE CAMP CLEAN-UP** Return Journey No activity planned

KEYS A) Co-ed student groups
B)
C)
D) About 16 students per

Teachers — N = Jim Nastis
J = Al Jeebra
W = Iritha Waterlund
S = Talia Storey

GRADE EIGHT

ENVIRONMENTAL FOCUS

THEMES

1. Man utilizes the resources of the earth in order to meet his various needs and wants.
2. Societal and personal expectations regarding quality of life determine, in part, resource use. Resource use is also influenced by human decisions and actions that may be political, economic, geographic, cultural or societal in their origin.
3. The processing of natural resources may result in positive or negative effects. Production by-products, for example, may have unanticipated short-term or long-term impact.
4. The earth's atmosphere and the conditions within it sustain and affect the human condition.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The students shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

- The urban environment is, in many cases, in a state of change due to many factors.
- One of the natural resources seldom considered is living space which is also being consumed and is in limited supply.
- Individual and collective human needs or wants may have to be regulated by established "institutions" and conflict may result.
- The atmosphere is a kind of dome or protective layer which surrounds the earth and both protects and sustains life.
- The atmosphere is heated by the sun's energy.
- The air in the atmosphere is in constant motion, due to the earth's revolution and rotation and to unequal heating, which is called weather.
- Man has advanced technologically to the point where he is able to make some measurements and predictions about the weather and, in some instances, to control it.
- The crust or surface of the earth is constantly being changed by numerous factors or influences.
- The crust of the earth provides the natural resources man has come to rely upon to meet his needs and to develop a productive society, and the resources of the earth's crust are in limited supply.
- The greater portion of the earth's surface is covered by water which is essential to all life.
- The crust of the earth may be studied to reveal some of the "secrets" of the past.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

- the formulation of models, such as pictures or diagrams, to explain or account for phenomena.
- experimenting to solve problems.

RELATED STRANDS

SOCIAL STUDIES — Topics include

ELECTIVE A — "Local History and Buildings" directs study toward community development. Communities change for economic, social, cultural, political or geographic reasons. Concepts such as urban sprawl, land annexation, and urban renewal can be examined. Photographic records for comparisons are encouraged.

TOPIC B — Canada: Development of the Individual and Institutions" discusses the interactions of the individual and the immediate institutions. Various issues, some of an environmental order, may bring about conflict between and among individuals and groups and institutions.

ELECTIVE B — "The Individual and Decision Making Institutions" and "The Meaning of Citizenship" are units which deal with the responsibilities, freedoms and rights of the individual and the citizen. Such influencing factors as geography, politics, economics and social values should be considered.

HEALTH — the student learns that

- there are certain social and environmental factors which affect his or her development and the development of others.
- a number of hazards exist within the environment, and that in places like the school, gymnasium, laboratory or shops, precautions must be taken.
- there is a need for sufficient living space to support or to house the human population.
- each individual must consider and be consistent in selected values, attitudes and actions and should recognize that these may have a noticeable affect on other people who have a worth and uniqueness of their own.

HOME ECONOMICS

* Sample material could include:

SPORTS GEAR — the student

- may participate in field trips to sporting or camping goods stores to study equipment.

PIONEER FOOD AND OUTDOOR COOKING — the student

- is able to prepare and compare the food products of the past and the present.
- understands some of the special techniques needed in outdoor cookery.

INDUSTRIAL EDUCATION

* Sample material could include:

SMALL ENGINES — the student

SCIENCE — the student becomes aware that much of the content of earth science focuses on the environment and learns that

- the atmosphere is heated by the Sun's energy which is absorbed by the earth.
- the water cycle is an important process which includes the atmosphere of the earth.
- the air of the atmosphere is in constant motion due to unequal heating and the rotation of the earth.
- local conditions in the atmosphere are referred to as weather. Various conditions of weather can exist due to seasonal change (Earth's revolution about the Sun), masses of air in motion creating areas of high and low pressure, the surface temperature of the earth, etc. Humans have learned, due to the development of various instruments and efficient communication links, to forecast the weather conditions.
- the crust of the earth is constantly being changed due to such factors as faults, weathering or erosion.
- the processing of raw materials may cause some damage to the environment.

ELECTIVE
- Materials from the earth's crust have had an important influence on mankind's daily lives.
- Fossil fuels and their products are important to the economy of Alberta.
- Since crustal materials are limited, exploration must be managed for maximum benefit.

ELECTIVE • The greater portion of the earth is covered by water in the form of seas and oceans. The study of this part of the environment is called oceanography.

ELECTIVE • Evidence for determining the past history of the earth and the environment comes from a study of the earth's crust now, in part, fossil discoveries.

- among the important study techniques available, those required for understanding various media and field trip studies, can be undertaken in a number of locations.
- more sophisticated processes allow people to perform like scientists.

MATHEMATICS — the student

- uses mathematics tools such as compass and straightedge to construct and bisect angles and to construct perpendicular bisectors.
- calculates perimeters and areas of polygons with and without formulae.
- writes mathematical sentences for English sentences.
- solves word problems which involve, in addition to the basic functions, extraneous information, interest, commission, tax and discount as well as percentages of increase or decrease.

INDUSTRIAL EDUCATION

* Sample student could include

SMALL ENGINES — the student

- to explain why there is a need for correct use of hand tools. (Page 26)

FINE ARTS

ART ELEMENT — the student

has a number of modules available for consideration. Although any of the modules could be presented, our suggestion would be:

1. **Group Projects** which involve the creation of designs for a holiday camp, a summer home, a children's playground, an exhibit for a trade fair, a shopping mall or some equivalent.

2. **Environmental Studies** which allow students to develop a discussion presentation on topics such as:
   a) community and urban planning and problems
   b) architecture — art form and function
   c) home design — interior design and landscape and environmental design
   d) furniture and appliance design
   e) industrial and mechanical design
   f) clothing and fabrics

MUSIC ELEMENT

The music program in the junior high school and middle level schools provides students with learnings in ability related

BUSINESS EDUCATION

HOME AND COMMUNITY RELATIONSHIPS — the student will

gain an understanding of the relationship of the home and the role that
- the student
- the parent
- the community
- society
- government

plays in developing responsible citizens.

*Further letters in Appendix

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

- the formulation of models, such as pictures or diagrams, to explain or account for phenomena
- experimenting to solve problems
- displaying good interpersonal skills in group projects and in out of school study activities
- measuring, using more sophisticated apparatus
- solving problems using appropriate skills, including those of mathematics
- identifying patterns and functions from sets of data
- solving word problems which involve percentages of increase or decrease
- designing, as a part of a group project, an exhibit or diagram having an environmental focus
- recording and illustrating in a creative project involving a broad plan and preparation
- developing a discussion presentation on a topic having an environmental focus
- applying previous knowledge toward an understanding of the human predicament and the reaction of humans to the changes brought about by advances in knowledge and technology
- listening and reading critically and with sensitivity to detect special and stylized vocabulary in such areas as advertising and propaganda
- speaking and writing to compare, explain, interpret or persuade

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

- the economy of Alberta is based to a large degree on the availability of natural resources, particularly fossil fuels, and Albertans, as well as others, should adopt more conservation oriented behaviour.
- each individual should develop a value system which takes into account the values and attitudes of others.
- decisions regarding resource use are seldom clear cut because of many factors having political, geographic, social, cultural or economic origin.
- decisions in all areas, particularly the environment, which are not carefully thought through may have unwanted results.

- calculates perimeters and areas of polygons with and without formulae
- writes mathematical sentences for English sentences.
- solves word problems which involve, in addition to the basic functions, extraneous information, interest, commission, tax and discount as well as percentages of increase or decrease.

LANGUAGE ARTS — the student

through the Expressed Thought and Value component
- shows a sensitivity to the human predicament
- understands individual and social reaction to change
- is aware of the effect of technology and the knowledge explosion and communication needs.

becomes increasingly proficient in dealing with many levels of oral and written language and can present both oral and written reports.

through the Research, Study and Composition component
- writes paragraphs and essays which compare, persuade, explain or interpret
- offers conclusions based on the development of ideas in terms of oral, written and visual material.

recognizes and develops a sensitivity regarding stylistic language use (both oral and written) in advertising and propaganda and notes the specialized vocabulary used.

PHYSICAL EDUCATION

NOTE: The Physical Education Program is in the process of upgrading and many of the new integrative possibilities, particularly within the elements of rhythm and dance, aquatics and outdoor pursuits, will become readily evident.

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CASE STUDY

GRADE NINE

Setting

Mr. Ed Ukater has been teaching for many years. He remembers the "good old days" when social studies consisted of teaching history, civics and geography. He had wrestled with enterprise teaching, open area schools, team teaching, continuous progress and other "movements in education". He gets neither excited nor depressed when hearing about computer literacy, native education or student evaluation. A fine teacher and a fine man, Mr. Ukater is well respected by his colleagues, the students and the community at large.

Ed is not at all sure about the most recent thrust toward environmental education that is being advocated. He would be most happy to be left alone to do what he does best — teaching social studies at the junior high level in his southern Alberta school. Mr. Ukater rather likes the new social studies program and he particularly enjoys introducing his students to the development of politics and governmental institutions (Grade Eight) and the growth and change among industrialized nations (Grade Nine).

The question of teaching environmental education came up during one of the regular lunch-hour games of cribbage. Ed commented that he could not see any but a very tenuous connection to his program. His playing partner, Wallace Murill, reminded him that industry was being labelled as the "villain" in such major issues of the environment as scarcity of resources and energy, acid-rain and the Three Mile Island nuclear dispute. These are issues with social, political and economic implications within them. Ed agreed and decided to look into environmental education a bit more closely.

Planning — Part One

When Mr. Ukater examined the Grade Nine section of the *Environmental Education Manual* he noted that someone had identified a large portion of the Grade Nine social studies program as related to environmental education. In the **Social Studies Strand** were:

- *Topic A: "Selected Market Economics" allows the student to examine issues related to the growth of industrialization in Great Britain and, if desired, the United States, in the 18th and 19th centuries. Technological changes and advances have had significant impacts on nations.*
- *Topic C: "Industrialization in Canada" investigates appropriate concepts from Canadian geography as well as considerations of the impact of industrialization on the physical environment. The conflicts that might occur between groups having different values, e.g., environmentalists, investors, workers or consumers, are worth discussion.*

and these were supported by:

- *Elective A: "Industrialization in Other Countries" suggests a comparison between the effects of industrialization in Great Britain (Topic A) and those noted in Japan and the United States. The societal and environmental reactions to industrial and technological change are a recommended focus.*
- *Elective B: "Local Industries and the Environment" is a unit devoted totally to determining the extent to which local industry may be concerned about conservation of the environment. Using the interview technique and basic research, students are able to report on various industries and prepare summaries which might appear in a school newspaper.*
- *Elective C: "What On Earth Are We Eating?" questions the use of chemicals, such as DDT or certain fertilizers, in agriculture. Various resource people (farmers, ranchers or district agriculturists) could provide help in answering questions for further student awareness and knowledge of the topic.*

Ed noted that arrows or linking lines tied the social studies material to **Objectives for Knowledge and Understandings:**

- *The growth of industrialization in nations such as Great Britain, the United States, Canada and Japan has had enormous social, political, economic and environmental effects on these countries.*
- *Man's technological advances have had impacts in the field of health where qualified professionals can provide assistance to individuals in many areas. However, quacks and faddists should be avoided.*
- *Sometimes difficult choices must be made between conservation and industrialization.*

Other linkages to the set of **Skills, Abilities and Processes** were noted. These were:

- *evaluating and assessing the reliability and validity of resources and information;*
- *listening, speaking and writing become more effective through debate and the preparation of essays, reports and selected correspondence.*

Connections were also established with the **Values and Attitudes** dimension. These were quite important due to the weight attached to them within the social studies program. These were noted as:

- *decisions, which may affect the environment, have the potential to be swayed by any number of factors and biases and it is only through careful study and analysis of available information that reasonable choices can be made;*
- *some people and organizations seem to have more power to influence decisions than do others;*
- *some nations consume disproportionate amounts of the earth's resources and this could be questioned ethically.*

Mr. Ukater noted that these objectives have apparent relationships with other subject area strands. He thought some were more appropriate than others and chose to pursue the **Fine Arts Strand** material:

- *"Film As An Art Form" — during which a photo-story or film story, in either black and white or colour, could be produced. Topics could include those having to do with environmental issues.*

and the **Language Arts Strand** items:

- *applies language arts skills with increasing proficiency to learning situations in all subject areas;*
- *displays proficiency in oral and written language and in the skill of listening through debates and in the preparation of essays and business letters;*
- *through the research, study and composition component*
  - *— distinguishes fact from opinion*
  - *— assesses the reliability and validity of resources and uses the 'responsible' material*
  - *— develops evaluation skills;*

and the **Science Strand** which reads:

- *technological advances have been possible due to the ability to control energy.*

Ed decided to speak to the fine arts teacher, Wallace Murill, the language arts teacher, Lotta Verbage, and the science teacher, Etna Little, to find out whether it would be possible for them to pool their efforts and resources. He was anxious to propose a type of united, almost "team-teaching" approach to a topic having to do with the social studies emphasis. The title might be "Industrialization and Technology: Are These Good or Bad?". A number of approaches could be used including film or photo stories, debate topics, research and report work as well as interviews and other data and information collecting methods. The idea seemed promising.

Mr. Ed Ukater reasoned, and quite correctly, that not everything should be, or needs to be, tied together with everything else all the time. Where interdisciplinary connections are real, obvious and logical, they are worth addressing. It is a mistake, however to "jam" things together artificially when they do not properly fit. Further, Ed came to the conclusion that every teacher can be a teacher of environmental education simply by adding a bit of emphasis, by selecting environmentally oriented illustrations and examples for consideration by students, or by setting an enthusiastic and interested personal example. **One does not have to be a biologist or an ecologist or an environmentalist.**

GRADE NINE

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC A — "Selected Market Economies" allows the student to examine issues related to the growth of industrialization in Great Britain (and, if desired, the United States) in the 18th and 19th centuries. Technological changes and advances have had significant impacts on nations.

ELECTIVE A — "Industrialization In Other Countries" suggests a comparison between the effects of industrialization in Great Britain (Topic A) and those noted in Japan and the United States. The societal and environmental reactions to industrial and technological change are a recommended focus.

TOPIC C — "Industrialization In Canada" investigates appropriate concepts from Canadian geography as well as considerations of the impact of industrialization on the physical environment. The conflicts that might occur between groups having different values, e.g., environmentalists, investors, workers, or consumers, are worth discussion.

ELECTIVE C — "Local Industries and the Environment" is a unit devoted totally to determining the extent to which local industry may be concerned about conservation of the environment. Using the interview technique and basic research, students are able to report on various industries and prepare summaries which might appear in a school newspaper.

ELECTIVE C — "What On Earth Are We Eating?" questions the use of chemicals, such as DDT or certain fertilizers, in agriculture. Various resource people (farmers, ranchers or district agriculturalists) could provide help in answering questions for further student awareness and knowledge of the topic.

HEALTH — the student learns that

in the health field there are a number of qualified professionals who can assist the individual with health problems including drug abuse, but quacks and faddists should be avoided.

advertising about products and materials can be misleading.

people should plan a life-long physical fitness program.

occupations develop and exist to satisfy the needs of society and contribute to the advancement of society.

they should begin to identify the environmental influences which may affect their career choices, including peers, family, other significant adults, community, geography, and economic conditions.

specialization of occupations has created an interdependency among workers.

HOME ECONOMICS

* Sample material could include

CHALLENGES AND DECISIONS — the student

understands that, within a person's personal environment decisions, events and situations arise which force adjustments or changes.

INDUSTRIAL EDUCATION

* Sample material could include

CAMERA AND DARKROOM — the student

can establish beforehand and describe the main theme or main subject to be used for a photograph. (Page 126)

ENVIRONMENTAL FOCUS

THEMES

1. Industrialization and technological developments have impacts upon the environment which may be either beneficial or harmful.
2. Technological advances have been possible largely due to man's ability to control energy.
3. People need to become knowledgeable about the changing conditions within the environment in order to analyze information and make sensible decisions about the environment and its problems.
4. Decisions which may influence the environment in some way may be influenced by cultural, economic, social or geographic factors. Choices between conservation and industrialization will be difficult.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The student shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

The growth of industrialization in nations such as Great Britain, the United States, Canada and Japan, has had enormous social, economic and environmental effects on these countries.

Man's ability to control energy has made technological advances possible.

Sometimes difficult choices must be made between conservation and industrialization.

Man's technological advances have had impacts in the field of health where qualified professionals can provide assistance to individuals in many areas. However, quacks and faddists should be avoided.

Energy, in its many forms, is used whenever heat, light or motion is present.

Sound energy has a great effect on people in their daily lives.

Within the environment, when two bodies having different temperatures come together, heat will flow from the higher temperature body to the lower temperature body.

Occupations, career choices and lifestyles are often the result of conditions within the environment of the individual and the economic, cultural, social and political influences that are found there.

Occupations develop as a result of society's needs and requirements and have become more specialized, creating an interdependency among workers.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

predicting and inferring from data gathered, recorded and graphed during studies of probability.

predicting and inferring on the basis of statistics.

formulating models, such as pictures and diagrams, which might involve ratio, scale drawing, etc.

measuring and applying formulae which are evolved from the Theorem of Pythagoras.

RELATED STRANDS

SCIENCE — the student learns that

technological advances have been possible due to the ability to control energy.

energy is present in the universe in a number of forms – electrical energy, chemical energy, mechanical energy, heat energy, light energy, magnetic energy, nuclear energy and gravitational energy.

ELECTIVE – electrical and light energy can do work and be changed from one form to another.

ELECTIVE – sound energy affects daily life.

most chemical changes require a great deal more energy than do physical changes.

when a body at a higher temperature is in contact with a body at a lower temperature heat flows from the first body to the second.

more sophisticated processes allow people to perform like scientists.

BUSINESS EDUCATION

LAW FOR YOUNG CITIZENS — the student will

be made aware of the various agencies which are involved in distributing aid, sharing information and assisting those in need.

find out about the various sources of legal aid to the juvenile which would include legal, social and counselling agencies.

MATHEMATICS — the student

ELECTIVE — in a unit on "Probability" will gather, record and graph data in order to predict future results with some degree of certainty.

ELECTIVE — in a unit on "Statistics" will learn how to gather and analyze data and use it to make his or her own inferences. The misuse of statistics will also be studied.

uses ratios to solve problems involving percentages, distance, speed and time, etc.

uses ratios to construct scale drawings.

demonstrates knowledge of the Theorem of Pythagoras and uses it in practical situations such as computing the heights of trees or buildings.

LANGUAGE ARTS — the student

applies language arts skills to learning situations in all subject areas with increasing proficiency.

displays proficiency in oral and written language, in the skill of listening through debates, and in the preparation of essays and business letters.

through the Research, Study and Composition component
- distinguishes fact from opinion
- assesses the reliability and validity of resources and uses the "responsible"

CAMERA AND DARKROOM — the student

can establish beforehand and describe the main theme or main subject to be used for a photograph. (Page 126)

uses available equipment to produce contact prints from negatives. (Page 128)

uses an enlarger to produce quality projection prints of a desired size from prepared negatives. (Page 128)

FINE ARTS

ART ELEMENT — the student

has a number of modules available for consideration. Although any of the modules could be presented, our suggestion would be —

1. **Film as an Art Form** during which a photo story or film story, in either black and white or colour, could be produced. Topics could include those having to do with environmental issues.

2. **Attitudes to Art Forms** which is a module that could be blended with studies in Science, English or Social Studies. Topics could include how our culture conditions and how we may determine which changes are "best" for our environment.

MUSIC ELEMENT

NOTE: The Music Program is in the process of upgrading and modification. Integrative possibilities will become readily evident.

*Further listings in Appendix

formulating models, such as pictures and diagrams, which might involve ratio, scale drawing, etc.

measuring and applying formulae which are evolved from the Theorem of Pythagoras.

listening, speaking and writing in order to become more effective in debate and the preparation of essays, reports and selected correspondence.

evaluating and assessing the reliability and validity of resources and information.

observing and understanding changes in individual and social attitudes and values.

recognizing the changes in communication needs and processes and determining their causes.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

some people and organizations seem to have more power to influence decisions than do others.

some nations consume disproportionate amounts of the earth's resources and this could be questioned ethically.

decisions which may affect the environment, have the potential to be influenced by any number of factors and biases and it is only through the careful study and analysis of available information that reasonable choices can be made.

there are certain lifestyles which enable people to live as a complementary part of the environment.

debates, and in the preparation of essays and business letters.

through the Research, Study and Composition component
- distinguishes fact from opinion
- assesses the reliability and validity of resources and uses the responsible material
- develops evaluation skills

through the Expressed Thought and Value component
- notices and understands changes in individual and social values
- understands the effects of the population explosion, affluence, diversity among people, and increased consumerism upon man's communication needs.

PHYSICAL EDUCATION

NOTE: The Physical Education Program is in the process of upgrading and modification. Integrative possibilities, particularly within the elements of rhythm and dance, aquatics and outdoor pursuits, will become readily evident.

CASE STUDY

GRADE TEN

Setting

Mr. Cal Kuluss is a teacher of mathematics in an inner-city school in one of Alberta's larger urban centres. Many of the students in the school are products of highly transient households, single parent families or relatively low socio-economic backgrounds. Mr. Kuluss and the rest of the staff have recognized that for students who are not always highly motivated the conventional, book-oriented lessons and strategies do not always succeed. All subjects, including mathematics, are best presented in a very solid, concrete and relevant manner.

Cal Kuluss is a graduate in mathematics and physics and he has completed several courses in curriculum development and special education on his way to a Master's degree. His hobbies include a very strong interest in science fiction and creative writing.

Planning — Part One

Mr. Kuluss and the rest of the staff are seeking ways to motivate all students, particularly those in Grade Ten, toward greater interest in the subjects and material being taught. Cal consulted with a team of staff colleagues on the possibility of initiating some sort of school-wide or grade-wide study project which might be of value. With Florence Flask, the chemistry teacher, Bill Biome, the biology teacher, Con Junkshun, of English and language arts, and the social studies teacher, Polly Sigh, Cal examined the *Environmental Education Manual for Grades I to XII* which is known to be based on an interdisciplinary approach.

The examination at the Grade Ten level resulted in an exploratory plan. The first step, in the minds of the team, was to identify some sort of theme or starting point. After much discussion, it was decided more was required than the general themes suggested in the manual's plan. Instead, what was sought was a project topic of such breadth or magnitude as to reach most of the subjects taught.

The discussion resulted in the suggestion that a suitable study project could be "Project Crisis". In such a project the approach considered was to involve as many of the subject strands as seemed appropriate. Cal Kuluss started in the mathematics section where he selected:

- *is aware that practical problems in the science or technical fields may require the development of mathematics equations and their algebraic graphic solutions*, and
- *understands about a variety of geometric terms applied to angles, triangles and other polygons and solves problems using the Theorem of Pythagoras in class or out-of-doors.*

Simultaneously, Polly Sigh suggested that part of the social studies offerings could also apply. Her choices were:

- **Topic A** — *"Expropriation" deals with the question of the right of government to force an individual to give up property to provide for the "common good". The thrust of the unit, together with "Amnesty International", focusses on human rights: the rights of the individual and the rights (needs) of the group.*
- **Elective C** — *"Crisis Canada" explores the problems which might affect future communities. Problems of a political or environmental nature are investigated to demonstrate the interconnections in the community and the world.*

Bill Biome indicated that he wanted a focus on the concepts of classifying according to selected characteristics and functions and the necessary processes of adaptation. Florence Flask stated that the sections in chemistry on chemicals and their effect on the environment were worthy of being included. Con Junkshun felt that the "product" from the involved students should focus on one of the strand components of language arts such as:

- *uses various methods of development such as reasons, examples, descriptive details and illustrations*, and
- *understands that a visual message is affected by colour, angle and movement.*

Planning — Part Two

The team "brainstormed" and came up with problem situations for the classes to deal with.

PROJECT CRISIS

As a result of a surprise attack (perhaps from outer space) our class is isolated, and in order to survive, must cope with a number of immediate problems.

Problem #1 — Math — The bridges have been destroyed. (a) How can we measure the width of the river so we know what must be spanned? (b) How can we measure the heights of trees to know if they are long enough to cross the river? [Hint — Pages 31 and 32 of the Mathematics 10-20-30 (1983) Curriculum Guide.]

Problem #2 — Social Studies — In order for us to survive everyone must be involved and efficient. Our group organization may demand individual sacrifice in favor of the common good. Given our circumstances, would the *Charter of Human Rights* for Canada be an appropriate guide for us? Discuss the pros and cons and report.

Problem #3 — Physics and Physical Education — We may have to travel some distance, day or night. We must know how to find our way. How can we learn to find our way in unfamiliar areas? [Hint — "Motion in the Heavens" could be related to stellar navigation and astronomy. Students could review maps, grids, orienteering, etc.]

Problem #4 — Health, Food Studies and Food Preparation — Certainly, one of the first considerations must be food and water. We must work out the amounts and types of foods and fluids to provide the nutrition necessary for survival.

Problem #5 — Health, Health Services and Chemistry — How will we be able to cope with such things as impure water, sickness and disease, injuries and accidents?

Problem #6 — Clothing and Textiles plus Physical Education — We may need to consider supplies of suitable clothing as well as their maintenance and repair. Can we plan for such clothing? Could we make garments? How will we keep them clean and in repair? [Hint — Numbers, types and sizes will have to be considered.]

Problem #7 — General — Obviously, our immediate needs would be very basic: food, clothing and shelter. Over the long term, however, we may identify other needs. These might include law and order, medicine, education and other factors to give belief, meaning and purpose to the future. Since we have survived there could be other survivors, elsewhere, who we might seek out. What sorts of people, with what types of skills and expertise, might we require? [Force some priority by limiting numbers to be added. Some consideration might be given to the age or sex factors.]

The team members were pleased to note that they had already involved many departments within the school. Cal Kuluss and Con Junkshun suggested that if the study was a success and really "caught fire" there would be plenty of opportunities to expand the project. Some of the ideas they listed for the future included:

a) **Language Arts** — the writing of reports, stories in science fiction and plays
b) **Drafting, Building Construction, Electricity, etc.** — the development of stage sets and displays
c) **Language Arts, Art and Visual Communication** — the development of stage backgrounds, displays, posters and advertisements
d) **Drama, Music and Language Arts** — the preparation and conduct of plays, playlets and skits

The five teachers presented their report, recommendations and suggestions to the rest of the staff. Although the initial reactions were somewhat reserved, after considerable discussion the tone of the meeting shifted to a "How can we make this work?" attitude. A variety of new suggestions were presented and added to the list already provided. "Project Crisis" began to take form.

Conclusion

School-wide projects like this one are very demanding in terms of time, effort and cooperation. The end results are not always electrifyingly successful, but very satisfying when they are.

GRADE TEN

ENVIRONMENTAL FOCUS

THEMES

1. The control and utilization of ENERGY has contributed to the growth and advancement of civilization. It has, however, led to problems of scarcity and other significant social and environmental questions.
2. TECHNOLOGY and INDUSTRIAL/AGRICULTURE have been instrumental in providing products and materials to meet the needs and wants of people. A social question should explore the difference between needs and wants.
3. The CONSERVATION of resources and energy is essential due to the recognition of the fact that these are in limited supply. A system of the "Four Rs" needs to be established — Reduce, Reuse, Recycle and Replenish wherever possible.
4. The POLLUTION of the environment has reached dangerous proportions. Individually and collectively people can and must act to solve or alleviate this problem.
5. The ADAPTATION of living things to their environment is essential to their survival. This is not the same as attempting to change the environment in order to meet perceived needs.
6. The INTERACTIONS and INTERRELATIONSHIPS which exist between components of the environment and between peoples are similar in that a state of interdependence exists. The diversity and complexity of the components is such that any significant change in one element often results in some noted change in other elements or in the whole of the environment.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The student shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

All individuals and groups have rights. They also have wants and needs and there is a distinction between the two in that needs are basic and wants unlimited.

There are a number of complex motions in the earthly environment and in the "heavens."

Only through carefully conducted on-site studies of the environment is it possible to observe and classify organisms within it and from there to determine and predict their processes of reaction and adaptation to changes within the environment.

The need for resources and materials from the environment may result in inter-regional or international disagreement and conflict which, in turn, may impact upon unity within nations and foreign policies among nations.

Research, technology and industry have accelerated the use of the resources and materials which provide the energy and products utilized by society and, since these resources and materials are in limited supply, a number of conservation strategies must be pursued.

All living things are made up of cells and there are a variety of types of cells.

The environment is in constant change due to natural causes. In addition, humans have inflicted themselves upon the environment causing further changes. Major changes, caused, for example, by storms, earthquakes, floods, fires and wars may result in human crises. People should, wherever possible, have plans for handling various types of crises, in place.

Health care is vital to the community. The chlorination and fluoridation of water supplies and the care and safety of the populace during man-made or natural crises are among the areas private and public service organizations must address.

All living things require nutrients which are obtained from the environment and these nutritional requirements may vary due to such factors as stages of growth and development, climate conditions and geography.

Individuals should maintain their bodies with a balance between work and leisure activities and should have a program of physical fitness.

RELATED STRANDS

SOCIAL STUDIES — Topics include

TOPIC A — "Expropriation" deals with the question of the right of government to force an individual to give up property to provide for the "common good". The threat of the unit, together with "Amnesty International", focuses on human rights, the rights of the individual and the rights (needs) of the group.

TOPIC B — "Canadian Unity" emphasizes the historical, political, economic, cultural and geographic influences on attitudes regarding national unity. Conflicts between federal and provincial governments on such issues as resource control may be samples of study.

TOPIC C — "Canada and the World" reviews the various influences, economic, political, social and cultural, which may affect a country's foreign policies. Canada's relationship within the Commonwealth and with the U.S.A. may be explored. With the latter, environmental studies may well be included.

ELECTIVE C — "Cross Canada" explores the problems which might affect future communities. Problems of a political or environmental nature are investigated to demonstrate the interconnections in the community and the world.

BUSINESS EDUCATION

BUSINESS FOUNDATIONS ELEMENT

— the student learns that

government provides aid and incentives for industries engaged in exploration and development.

much of Canada's early growth and development has been based on the exploitation of raw materials which have greatly exceeded the requirements and needs of the population.

all individuals and groups have wants and needs and there is a distinction between the two in that wants are unlimited but resources are limited.

HEALTH — the student learns that

chlorination and fluoridation of water supplies is designed to protect the population from disease.

within the community there are a number of public and private health care service agencies which have been formed to react to crises of one kind or another and which often succeed due to volunteer assistance.

habits for certain foods are frequently learned through custom and advertising.

individuals need to care for their bodies, their personal environment, through an established program of physical activity and a balance between work and leisure activity.

INDUSTRIAL EDUCATION

AUTOMOTIVES 12 ELEMENT — the student will

understand that engines are fundamental to a modern industrial society.

ELECTRICITY — ELECTRONICS 12 ELEMENT — the student will

understand electricity and its importance as a form of energy.

learn to use a variety of instruments and tools to measure.

RELATED STRANDS

SCIENCE

PHYSICS ELEMENT — the student learns that

the motions we observe in our environment are very complex.

the environment can influence the motion of an object.

ELECTIVE — Through the study of "Motion in the Heavens" one can learn about the environment beyond the earth through naked eye observations, meteor counts and observations of the Moon's surface.

ELECTIVE — It is possible to learn more about the skills and techniques of problem-solving and scientific research by visiting, observing and interviewing practising scientists and researchers in their laboratories.

BIOLOGY ELEMENT — the student learns that

living things are composed of cells and there are a number of different types of cells.

the light microscope allows people to see some cell structures.

taxonomy is the science of classifying organisms, and grouping may be done on the basis of such criteria as morphology, degree of complexity, habitat or nutritional requirements.

organisms range from the very primitive one-celled to the highest level of complexity displayed in mammals.

CHEMISTRY ELEMENT — the student learns that

chemicals and chemical processes have become important to the economy, as have heavy metals, and there is always the potential of harm to the environment through the extraction and use of these materials.

ELECTIVE — Individuals have the responsibility of maintaining the quality of the environment when chemicals are used. It is necessary to acquire knowledge about problems and proposed solutions particularly with respect to air and water contaminants. (Chemicals in the Environment)

ELECTIVE — There are some chemicals used to produce materials which are very difficult to dispose of without endangering the ecology of the environment. Included are plastics and certain fabrics, soaps and detergents, pesticides, rubber and cosmetics, perfumes or aerosols. (Chemicals in the Marketplace)

NOTE: All the sciences apply more sophisticated processes to improve knowledge and performance.

HOME ECONOMICS

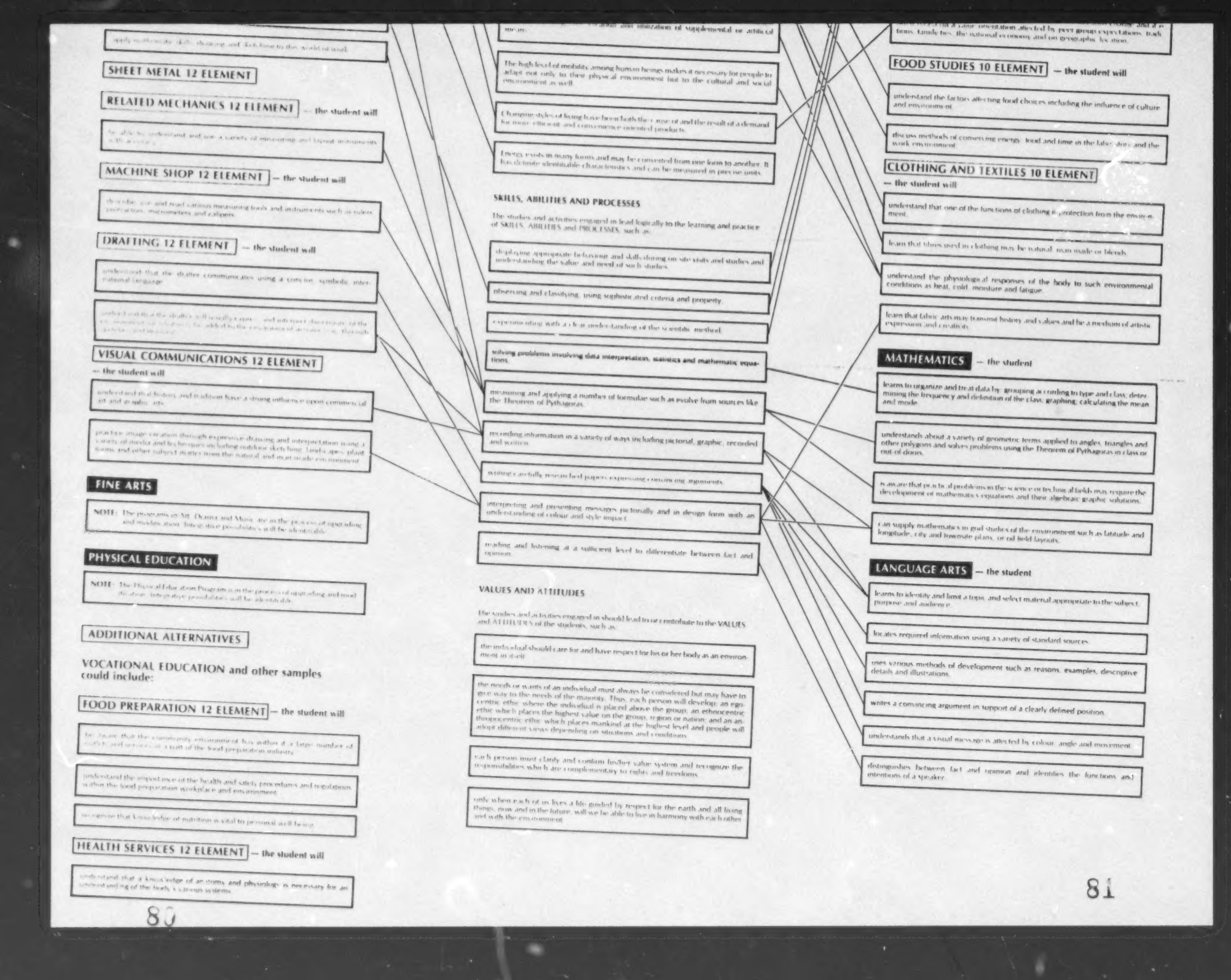
BEAUTY CULTURE ELEMENT — the student will

in Cosmetology (chemistry), learn about the need to safely dispose of non-degradable materials and chemicals and collect pictures to reinforce understanding of the responsible and irresponsible use of natural resources.

PERSONAL LIVING SKILLS ELEMENT

— the student learns that

there is a need for resource management if one is to identify and select values, goals and standards and achieve them.


SHEET METAL 12 ELEMENT
RELATED MECHANICS 12 ELEMENT — the student will
MACHINE SHOP 12 ELEMENT — the student will
DRAFTING 12 ELEMENT — the student will
VISUAL COMMUNICATIONS 12 ELEMENT — the student will
FINE ARTS
NOTE: The programs in Art, Drama and Music are in the process of upgrading and module sheets integrative procedures will be identifiable.
PHYSICAL EDUCATION
NOTE: The Physical Education Program is in the process of upgrading and module sheets integrative procedures will be identifiable.
ADDITIONAL ALTERNATIVES
VOCATIONAL EDUCATION and other samples could include:
FOOD PREPARATION 12 ELEMENT — the student will
HEALTH SERVICES 12 ELEMENT — the student will
SKILLS, ABILITIES AND PROCESSES
The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:
observing and classifying, using sophisticated criteria and property
solving problems involving data interpretation, statistics and mathematic equations.
reading and listening at a sufficient level to differentiate between fact and opinion.
VALUES AND ATTITUDES
The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:
the individual should care for and have respect for his or her body as an environment in itself.
only when each of us lives a life guided by respect for the earth and all living things, now and in the future, will we be able to live in harmony with each other and with the environment.
FOOD STUDIES 10 ELEMENT — the student will
understand the factors affecting food choices including the influence of culture and environment.
CLOTHING AND TEXTILES 10 ELEMENT — the student will
understand that one of the functions of clothing is protection from the environment.
learn that fibres used in clothing may be natural, man-made or blends.
understand the physiological responses of the body to such environmental conditions as heat, cold, moisture and fatigue.
learn that fabric arts may transmit history and values and be a medium of artistic expression and creativity.
MATHEMATICS — the student
LANGUAGE ARTS — the student
learns to identify and limit a topic and select material appropriate to the subject, purpose and audience.
locates required information using a variety of standard sources.
uses various methods of development such as reasons, examples, descriptive details and illustrations.
writes a convincing argument in support of a clearly defined position.
understands that a visual message is affected by colour, angle and movement.
distinguishes between fact and opinion and identifies the functions and intentions of a speaker.

CASE STUDY

GRADE ELEVEN

Setting

Ms. Grada Leven, is a biology teacher in one of Alberta's larger high schools in an urban center in the southern part of the province. Grada is a firm believer in the value of field work with her students. She is a member of the Alberta Field Naturalist Society and the Alberta Teachers' Association Environmental and Outdoor Education Specialist Council.

Grada has been identified as one of the foremost biology teachers in the province. She has served as a pilot teacher for a number of projects and on several ad hoc curriculum sub-committees.

Ms. Leven is married and her husband, Sven, works as an environment planner for one of the major oil companies. They have no children.

Planning — Part One

Ms. Leven is very interested in the concept of interdisciplinary instruction despite her devotion to the discipline of science-biology. She has discussed her interests with Sven and they have come to the conclusion that a unit on environmental studies might act as a suitable vehicle. While few of her colleagues on staff have been approached, she has broached the subject with the social studies teacher, Charles Atlas, the physical education teacher, Jim Shortts and the mathematics teacher, Matt Matex, and they seem very interested.

When Ms. Leven investigated the *Environmental Education Manual*'s Grade Eleven section she began her exploration in the section labelled **Science Strand — Biology Element.** The parts noted were those she had dealt with, in one way or another, for a number of years:

- *ecology is the study of the interrelationships between organisms and their environments;*
- *populations are composed of many individuals of the same species and they are defined in terms of space, time and kind;*
- *populations have exponential growth patterns which are normally restricted by environmental limits, however humans are able to overcome these limits;*
- *all the sciences apply more sophisticated processes to improve knowledge and performance.*

Grada had been invited to involve her class in the Alberta Environment Water Quality Study where the students engage in sophisticated water sampling techniques and specimen counts the results of which are collated and incorporated with data from other classes for use by that department. This "field work with a real purpose" mentality should help her motivate her students.

She noted, and had discussed with Mr. Atlas, the fact that the **Social Studies Strand** defines one topic, at least, which, in the human context, relates to her study:

- *Topic B — "Global Problems of Population and Resource Distribution" examines population patterns and other factors affecting technological development such as food supplies, natural resources, energy and the environment.*

She reasoned that much of the data collected by the students would have to be expressed in numeric or graphic form. The **Mathematics Strand** suggested:

- *can define relations for ordered pairs, graphs or open sentences. A study skill useful for graphing and sketching to solve problems which involve interpolation, extrapolation and projection.*

Also, she planned to call upon Jim Shortts to assist her in teaching the students about the kind of clothing and food that should be considered during such field work. Perhaps both she and Jim should approach the **Home Economics** teacher, Celecta Pattern, for some input regarding dress since one part of that program (Clothing and Textiles 20 Element) suggested:

- *understands the special clothing requirements involved to meet the needs of people in different activities, i.e., sports.*

Finally, she spoke to Artista Kamra, who dealt with **Industrial Education's** Visual Communications 22 Element, for some advice on using tools to record the activities which she and Charles might plan. The material:

- *understand that the camera is a primary tool in the communication process, and*
- *complete a slide-tape presentation and a creative photo portfolio to present a message to a visually oriented society,*

seemed to fit their needs.

Ms. Leven managed to convince these colleagues to present one or more "guest lectures" to her class as a part of her "Environmental Biology" unit and in preparation for her field study work.

Planning — Part Two

Grada Leven and Charles Atlas decided to go one step further in their joint planning. Charles' **Social Studies Strand**

- **Topic B** — *"Global Problems of Population and Resource Distribution"*

is very similar in tone and direction to the component in the old biology program.

- *"Environmental Biology" —*
  - *d) The involvement of man with the environment focussing on the effects of population growth, management of resources, and pollution.*

The two decided to use as their basic reference, the text recommended in the former Alberta Education curriculum guide for Biology 10-20-30, which is *Environment and Man* by R. Wagner (George R. McLeod Limited, Toronto, 1978).

At the same time, Grada sought out her science colleague in **Physics,** N.R.G. Mattierre, to determine whether the elective unit

- *"Energy Resources, Energy Crisis, Energy Conservation"*

might have material which could contribute.

Ms. Leven, Mr. Atlas and the remaining staff took note of the admonition in the curriculum guide for **Biology,** regarding the Wagner text, which read, "each teacher should feel free to choose those topics which he/she feels are of greatest relevance to the local students".

They decided that they would stress:

1. Chapter Three: Moving Earth — The Reshaping of Our Environment
2. Chapter Nine: Extinction — Bungling the Biota
3. Chapter Twelve: The Urban - Suburban Environment: The Rise of the City
4. Chapter Twenty-Two: Supporting Earth's Population — We the People Problem and Solution
5. Chapter Twenty-Three: Population Control — We the People Problem and Solution
6. Chapter Twenty-Four: Alternatives — We the People Problem and Solution

It was also noted, in the **Biology** curriculum guide, that chapters 23 and 24 "can be regarded as contentious" so Grada and Charles discussed with Mr. Argue, the language arts teacher, the possibilities of introducing some of the issues as a debating exercise. They suggested that the rationale for language arts was found in the strands:

- *is able to analyze propaganda and advertising techniques used in viewed messages and is aware of writing and editing styles in biasing content;*
- *gains information from reference sources and arranges the information with purpose;*
- *can write a convincing argument in support of a clearly defined position and/or a short research paper on a subject.*

These skills were completely consistent with those recommended for the issue investigation as found in the **Social Studies** curriculum guide (pages 82 and 83).

The principal, Mr. Leader, was very pleased with the cooperative organization which had taken place as the result of Ms. Leven's efforts. He gave his full support to the project and willingly authorized the field-study periods for the science biology classes. He reckoned that the project actually saved class instruction time which would be sufficient to warrant allowing students the out-of-school experience.

GRADE ELEVEN

ENVIRONMENTAL FOCUS

THEMES

1. The ECOLOGICAL RELATIONSHIPS which exist within the environment – the nature of individuals, populations and species as well as the structure of communities and biomes – need to be understood. Man's effect upon the environment can then be examined.
2. The advances in TECHNOLOGY occur not only in response to the wants and needs of people but may act as a change agent which can alter the needs, behaviours and values of a society.
3. The indiscriminate uses of ENERGY have resulted in the real possibility of shortages in energy supplies. The solutions to such a problem may include conservation, the search for alternate sources, less consumption and the production of smaller and more efficient products.
4. The problem of POLLUTION and the DISPOSAL OF WASTE have reached very significant proportions. Mankind possesses much of the skills and knowledge needed to combat these problems but has not yet developed the will and dedication to act.
5. When people do not voluntarily act in a responsible way there may be a need for imposed LAWS, REGULATIONS and CONTROLS. An accepted set of values and attitudes which lead to a type of environmental ethic based on more complete knowledge and understanding would be more desirable for society.
6. The SPECIAL ABILITIES AND SKILLS OF HUMANS allow them to live within and travel about in a wide variety of environments. Humans are unique in this regard.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The student shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

Relationships and interrelationships which exist within the environment (communities, populations, ecosystems and biomes) are essential. Only through awareness and careful study can the cause-effect conditions of the environment and the impact of human action be measured or predicted.

Technological changes have an impact on people which can be either beneficial or harmful.

Many chemicals are used in industry and, in many cases, the safe disposal of the chemicals, their byproducts and waste products has become an environmental problem.

The world is characterized in many areas by over population and an inequitable distribution of resources. No simple and generally applicable solutions to these problems have been found.

When businesses and industries are being planned a number of factors must be considered. Assessment of the political/business environment as well as the influence of government and other societal structures is necessary.

The hydrocarbons are an important component of Alberta's industry. They affect the economy of the province and the success and lifestyle of its citizens.

The automobile is one classic example of a device which has revolutionized the behaviour and lifestyle of people.

People consume energy and resources to such a degree that future shortages are a real possibility. A number of alternative solutions are being developed including practices of conservation, exploration of alternate sources and efforts to produce smaller, more efficient and less consumptive devices and machines.

Many industries and agencies have been accused of polluting and otherwise damaging the environment. Business planners, particularly those in the extraction and manufacturing areas and, to a lesser degree, the distributive and service areas must be aware of changes in the environment condition.

Man has developed sophisticated systems and electronic devices to extend his

RELATED STRANDS

SOCIAL STUDIES — topics include

ELECTIVE A — Technology as a Force for Change: looks at the positive and negative changes and impacts which may be resulting from technological advances.

ELECTIVE A — Nuclear Power: Saviour or Villain: discusses nuclear energy as a possible alternative to fossil fuels.

TOPIC B — Global Problems of Population and Resource Distribution: examines population patterns and other factors affecting technological development, such as food supplies, natural resources, energy and the environment.

ELECTIVE B — Appropriate Technology: examines possible limits being set as to the size and impact of new technologies. Case studies, simulations and field studies which focus on devices which may be smaller, more efficient, or which use alternative energy sources, should be included within the topic.

HEALTH — the student learns that

technology can and does have an impact on lifestyle and on the environment and each person has a right and a responsibility to keep the environment as free as possible from dangers to health.

the environment is very important in actualizing the fullest development of overall human potential.

BUSINESS EDUCATION

MARKETING ELEMENT — the student learns that

government influences the marketing environment in its roles as protector, participant, promoter and purchaser.

when a business is planned for, short environmental factors must be considered and these include density of population, type of market (international, national, provincial, rural, urban), proximity to other industry, transportation, raw materials and the ethnic or cultural backgrounds of the potential clientele or employees.

LAW ELEMENT — the student learns that

laws have been instituted to maintain order and to govern the relationships of individuals or groups with one another.

[illegible] apply to the environment as licenced, created, and regulators affecting resource exploration and industrial conduct. Similarly, the use of land or property in its relationship with another person's use and enjoyment of their property, the concept of a property boundary to define property rights.

BUSINESS PROCEDURES ELEMENT — the student learns that

businesses are classified as extract (e.g. mining), manufacturing (e.g. meat processing), distributive (e.g. retail outlets), and service (e.g. restaurants).

the communication skills of listening, speaking and writing are necessary for success in the workplace or working environment.

DATA PROCESSING ELEMENT — the student learns that

the computer allows man to accumulate and process information at very high speed and very efficiently and to make judgements involving many pieces of information.

the computer is now utilized in many areas of society such as business, government and science.

HOME ECONOMICS

RELATED STRANDS

SCIENCE

BIOLOGY ELEMENT — the student learns that

ecology is the study of the interrelationships between organisms and their environment.

biotic factors involve the living world, abiotic factors involve the nonliving world and these factors interact.

the biosphere is composed of communities, ecosystems and biomes which, in Canada (and Alberta), are influenced by climate.

genetics is the study of the transmission of characteristics from one generation to the next.

food chains, pyramids and webs map the flow of energy through the biotic world and these may be affected by such external factors as pesticides.

populations are comprised of many individuals of the same species and they are defined in terms of space, time and kind.

populations have exponential growth patterns which are normally restricted by environmental limits however, humans are able to overcome these natural limits.

CHEMISTRY ELEMENT — the student learns that

ELECTIVE – Through the study of the **Chemistry of the Car** and the **Chemistry of Fuel** one must become aware of the huge importance of the part they play in the lifestyle of North Americans.

ELECTIVE – The **Environmental Chemistry** unit leads the individual to an objective assessment of the major sources of pollution and the opportunity to identify and evaluate proposed solutions to certain problems caused by the indiscriminate use of chemicals. Topics could include: Major Problems in Technology; Waste Disposal; Chemical Aspects of Water Pollution; Air Contamination; and Purification Technology.

carbon compounds are some of the most important substances found within the environment. The hydrocarbons are an important component of industry in the Province of Alberta.

PHYSICS ELEMENT

ELECTIVE – The entire unit, **Energy Resources, Energy Crisis, Energy Conservation,** focusses on the environment. Topics covered include: science and technology; energy and power alternatives; energy conservation; and fossil fuels.

ELECTIVE – The entire unit, **Physics of the Environment,** deals with appropriate environmental problems. The topics addressed are: Air Pollution; Water Pollution; Sound Pollution; Radiation Pollution; Thermal Pollution; Electromagnetic Pollution; Light Pollution/Vision; Nuclear Power Research; and the Scientist's Moral Responsibility.

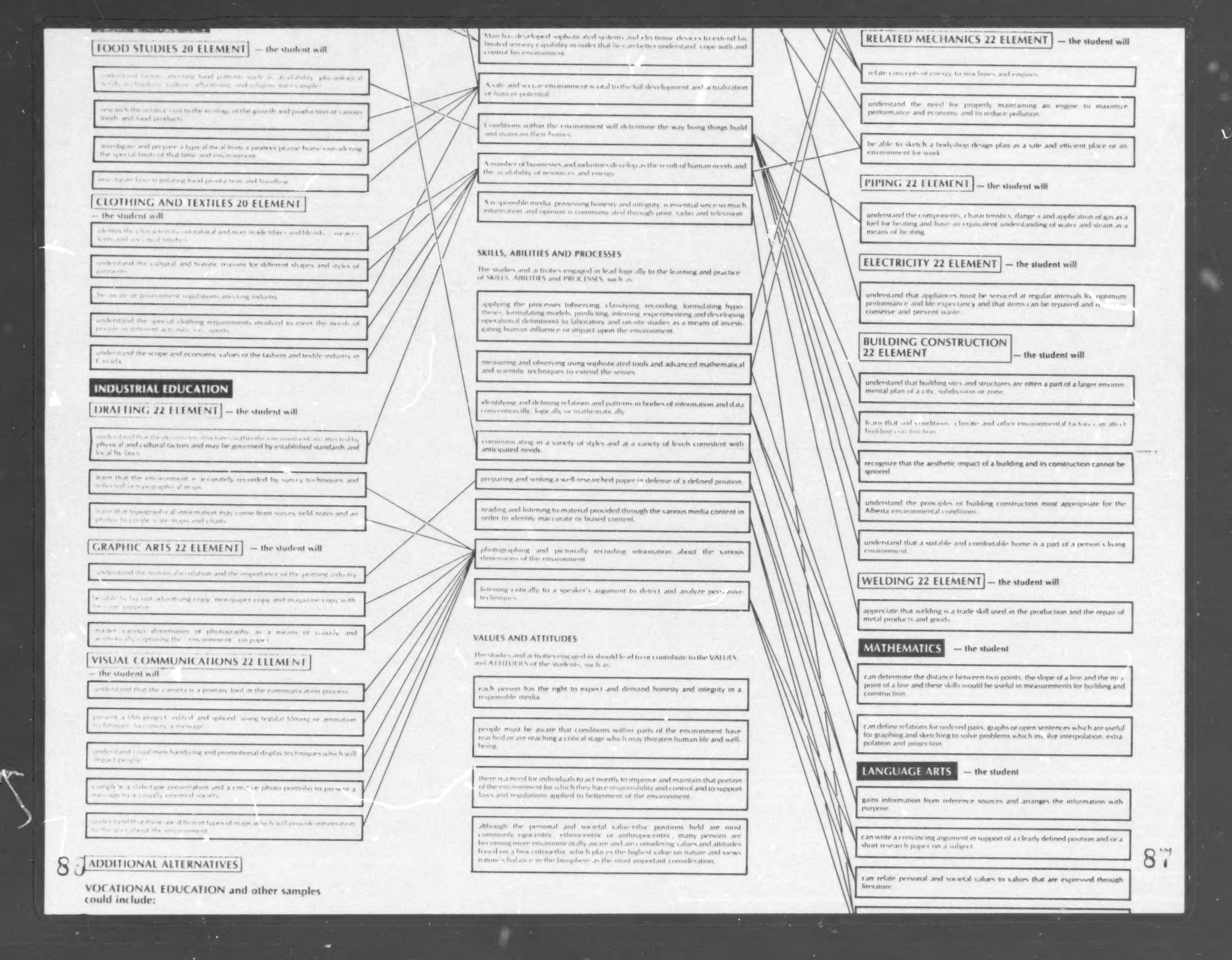
NOTE: All the sciences apply more sophisticated processes to improve knowledge and performance.

INDUSTRIAL EDUCATION

in the AUTOBODY 22 ELEMENT,

AUTOMOTIVES 22 ELEMENT and

RELATED MECHANICS 22 ELEMENT — the student will


FOOD STUDIES 20 ELEMENT — the student will
understand factors affecting food patterns such as availability, physiological needs, religious customs, advertising, and religious taboos for example
research the relative cost to the ecology of the growth and production of various foods and food products
investigate and prepare a typical meal from a pioneer prairie home considering the special limits of that time and environment
investigate ways of reducing food production and handling
CLOTHING AND TEXTILES 20 ELEMENT
— the student will
identify the characteristics of natural and man made fibres and blends — wearer, care and structural features
understand the cultural and historic reasons for different shapes and styles of garments
be aware of environmental regulations affecting industry
understand the special clothing requirements involved to meet the needs of people in different activities, i.e. sports
understand the scope and economic values of the fashion and textile industry in Canada
INDUSTRIAL EDUCATION
DRAFTING 22 ELEMENT — the student will
understand that the decisions we make affect the environment are affected by physical and cultural factors and may be governed by established standards and local by-laws
learn that the environment is accurately recorded by survey techniques and reflected in topographical maps
learn that topographical information may come from survey field notes and air photos to create scale maps and charts
GRAPHIC ARTS 22 ELEMENT — the student will
understand the historical evolution and the importance of the printing industry
be able to lay out advertising copy, newspaper copy and magazine copy with its own purpose
master various dimensions of photography as a means of visually and aesthetically capturing the environment on paper
VISUAL COMMUNICATIONS 22 ELEMENT
— the student will
understand that the camera is a primary tool in the communication process
present a film project, edited and spliced, using regular filming or animation techniques to convey a message
understand visual merchandising and promotional display techniques which will impact people
complete a slide-type presentation and a creative photo portfolio to present a message to a visually oriented society
understand that there are different types of maps which will provide information to the user about the environment
Man has developed sophisticated systems and electronic devices to extend his limited sensory capability in order that he can better understand, cope with and control his environment
A safe and secure environment is vital to the full development and actualization of human potential
Conditions within the environment will determine the way living things build and maintain their homes
A number of businesses and industries develop as the result of human needs and the availability of resources and energy
A responsible media, possessing honesty and integrity, is essential since so much information and opinion is communicated through print, radio and television
SKILLS, ABILITIES AND PROCESSES
The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:
applying the processes (observing, classifying, recording, formulating hypotheses, formulating models, predicting, inferring, experimenting and developing operational definitions) to laboratory and on-site studies as a means of investigating human influence or impact upon the environment
measuring and observing using sophisticated tools and advanced mathematical and scientific techniques to extend the senses
identifying and defining relations and patterns in bodies of information and data conventionally, logically or mathematically
communicating in a variety of styles and at a variety of levels consistent with anticipated needs
preparing and writing a well-researched paper in defense of a defined position
reading and listening to material provided through the various media content in order to identify inaccurate or biased content
photographing and pictorially recording information about the various dimensions of the environment
listening critically to a speaker's argument to detect and analyze persuasive techniques
VALUES AND ATTITUDES
The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:
each person has the right to expect and demand honesty and integrity in a responsible media
people must be aware that conditions within parts of the environment have reached or are reaching a critical stage which may threaten human life and well-being
there is a need for individuals to act overtly to improve and maintain that portion of the environment for which they have responsibility and control and to support laws and regulations applied to betterment of the environment
although the personal and societal value ethic positions held are most commonly egocentric, ethnocentric or anthropocentric, many persons are becoming more environmentally aware and are considering values and attitudes based on a biocentric ethic which places the highest value on nature and views nature's balance in the biosphere as the most important consideration
RELATED MECHANICS 22 ELEMENT — the student will
relate concepts of energy to machines and engines
understand the need for properly maintaining an engine to maximize performance and economy and to reduce pollution
be able to sketch a bodyshop design plan as a safe and efficient place or an environment for work
PIPING 22 ELEMENT — the student will
understand the components, characteristics, dangers and application of gas as a fuel for heating and have an equivalent understanding of water and steam as a means of heating
ELECTRICITY 22 ELEMENT — the student will
understand that appliances must be serviced at regular intervals to optimum performance and life expectancy and that items can be repaired and to conserve and prevent waste
BUILDING CONSTRUCTION 22 ELEMENT — the student will
understand that building sites and structures are often a part of a larger environmental plan of a city, subdivision or zone
learn that soil conditions, climate and other environmental factors can affect building construction
recognize that the aesthetic impact of a building and its construction cannot be ignored
understand the principles of building construction most appropriate for the Alberta environmental conditions
understand that a suitable and comfortable home is a part of a person's living environment
WELDING 22 ELEMENT — the student will
appreciate that welding is a trade skill used in the production and the repair of metal products and goods
MATHEMATICS — the student
can determine the distance between two points, the slope of a line and the mid-point of a line and these skills would be useful in measurements for building and construction
can define relations for ordered pairs, graphs or open sentences which are useful for graphing and sketching to solve problems which involve interpolation, extrapolation and projection
LANGUAGE ARTS — the student
gains information from reference sources and arranges the information with purpose
can write a convincing argument in support of a clearly defined position and/or a short research paper on a subject
can relate personal and societal values to values that are expressed through literature
ADDITIONAL ALTERNATIVES
VOCATIONAL EDUCATION and other samples could include:

[illegible] a wide base of knowledge and a creative attitude particularly to prevent a shortage in a rapidly changing society.

understand that there are different types of maps which will provide information to the user about the environment.

ADDITIONAL ALTERNATIVES

VOCATIONAL EDUCATION and other samples could include:

HEALTH SERVICES 22 ELEMENT — the student will

understand that a knowledge of anatomy and physiology is necessary in order to understand the causes, diagnoses, treatment and health promoting care of diseases which may affect the body's various systems.

FOOD PREPARATION 22 ELEMENT — the student will

understand that the way food is presented and served does much to contribute to its enjoyment.

realize the many steps involved in selecting, preparing, presenting and cleaning up after food preparation.

of the environment for which they have responsibility and control and to support laws and regulations applied to betterment of the environment.

although the personal and societal value-ethic positions held are most commonly egocentric, ethnocentric or anthropocentric, many persons are becoming more environmentally aware and are considering values and attitudes based on a bio-centric-ethic which places the highest value on nature and views nature's balance in the biosphere as the most important consideration.

gains information from reference sources and arranges the information with purpose.

can write a convincing argument in support of a clearly defined position and/or a short research paper on a subject.

can relate personal and societal values to values that are expressed through literature.

is able to analyze propaganda and advertising techniques used in viewed messages and is aware of writing and editing styles in biasing content.

FINE ARTS

NOTE: The programs in Art, Drama and Music are in the process of upgrading and modification. Integrative possibilities will be identifiable.

PHYSICAL EDUCATION

NOTE: The Physical Education Program is in the process of upgrading and modification. Integrative possibilities will become evident.

GRADE TWELVE

RELATED STRANDS

SOCIAL STUDIES — topics include

TOPIC B — Cooperation and Conflict Among States — explores the factors nations have been prepared to use whatever means available to protect their territorial, political and economic interests. There is an increasing concern for the welfare of all mankind. International relations and concerns may revolve about rate of population, control of energy and staple supplies and the environment.

HOME ECONOMICS

FOOD STUDIES 30 ELEMENT — the student will

recognize, study and discuss the many concerns facing the world in terms of food supply and food problems. Factors to be examined include climate and weather, government and politics, war, resource management, scarcity and waste.

debate and discuss such topics as energy efficiency, over abundance of electrical appliances, and alternatives to electrical appliances.

understand the differing nutritional requirements of people in different stages of the life cycle (i.e., infancy, pregnancy, aging).

CLOTHING AND TEXTILES 30 ELEMENT — the student will

understand the development of and functions of clothing or selected items of clothing (kimono, sari, parka) considering the effects of a country's culture, climate, economy, etc.

consider some of the possibilities of clothing in the future based on such factors as new technology, fabrics and processes, and new environments (space, jungle, desert, etc.).

HEALTH — the student learns that

society has a number of legitimate needs and the actions and attitudes of individuals either contribute to or detract from those needs.

current attempts to improve the human race through regulation of inherited characteristics and eugenics attempts to improve the human race through environmental regulations are or will be influences in making individual and social decisions.

INDUSTRIAL EDUCATION

ELECTRONICS 32 ELEMENT — the student will

understand how radio communication has affected people and their knowledge and understanding of their place in the environment.

understand some of the ways television has revolutionized the life styles and performance of individuals.

understand that electronic advances like radio, television and computers allow people to manage and communicate large amounts of information rapidly and accurately.

understand that the computer is changing and will change the ways people live and work.

AUTOMOTIVES 32 ELEMENT — the student will

describe the methods that manufacturers are employing to achieve better fuel economy.

ENVIRONMENTAL FOCUS

THEMES

1. One of the more serious and sensitive problem areas for the environment is POPULATION GROWTH. Mankind has shown little sign of possessing the instinctive biological mechanisms to curtail population growth. Any hope, therefore, of effective self-regulation of numbers depends upon conscious social decisions and practice.

2. The SCARCITY OF RESOURCES AND ENERGY is leading man toward a vigorous search for renewable alternatives. Possible alternatives must be examined, not only in terms of social, economic and political costs, but in terms of their potential long term costs to the environment.

3. The INEQUITABLE DISTRIBUTION OF RESOURCES AND ENERGY forces adjustments in the interrelationships that exist among groups or regions or nations. Interdependency may lead to either cooperation or conflict between parties.

4. The magnitude of POLLUTION in some areas is such that it has reached the danger level. The preservation and protection of air, soil and water is essential to all living things.

5. Problems with the environment have reached a scale where there are now the beginnings of ENVIRONMENTAL LAW. Individuals, groups, peoples and nations will have to take full responsibility for their actions when their behaviours threaten the stability of the environment for others.

6. The FUTURE of the world as we know it would seem to lie in the individual and collective UNIVERSAL UNDERSTANDING of these fundamental concepts about the ENVIRONMENT:
   a) An interdependence exists between all living things and their environment.
   b) All components of the environment are in constant change.
   c) The biophysical environment is characterized by complexity and diversity, and
   d) All resources within the environment are in limited supply.

With such knowledge and awareness the population must be prepared to demonstrate the social will to act responsibly toward the environment.

OBJECTIVES

KNOWLEDGE AND UNDERSTANDINGS

The student shall engage in studies and activities which will provide them with the following KNOWLEDGE and UNDERSTANDINGS:

Nations are prepared to use whatever means available to protect their territorial, political and economic interests and international relations.

The body requires nutrients which it processes and transfers to the tissues where much is used for cellular growth.

The higher orders of living things, particularly humans, regulate their internal environments through coordination between body systems.

Living things possess sensory receptors which allow reaction to stimuli within the environment.

Among the problems to be faced by citizens and governments of the world are the inequitable distribution of some resources and the rapidly developing shortage of others.

Nutritional needs vary as people grow and develop. They are often affected by physiological changes and conditions.

Native and imported cultural influences can impact such things as clothing fashions, building styles and food choices.

Enormous technological advances have resulted in the creation and development of new products, materials and scientific techniques which, while addressing earlier problems and needs, have the capacity to cause additional and often unanticipated problems and requirements.

People must become aware of the cost of extracting material resources, not only in terms of money and effort, but in terms of waste and the disruption, degradation and destruction of the environment.

RELATED STRANDS

SCIENCE

BIOLOGY ELEMENT — the student learns that

cellular processes are fundamental to life.

humans must take in and prepare the required nutrients for absorption and body fluids distribute these to and carry wastes from the tissues.

regulation of the internal environment requires coordination between the nervous and hormonal systems.

stimuli in the environment are first detected by sensory receptors.

CHEMISTRY ELEMENT — the student learns that

problems arise from the dispersal of products that support our lifestyles. These include, in part, the expenditure of non-renewable resources. Man exhibits a lack of respect for the environment and uses processes which degrade the environment.

ELECTIVE — Through a study of Fossil Fuels as a source of energy, North American dependency on a non-renewable resource is reviewed.

PHYSICS ELEMENT — the student learns that

ELECTIVE — Through a study entitled "Pictures of a Megatonde — An Energy Assessment Project", energy sources, energy transformations and conservation measures are examined. Extension topics include: Energy to Heat Your Home; Solar Energy; Energy From the Wind; and Energy for an Automobile.

LOCAL UNITS — Should direct their attention to the use and misuse of science and such social problems as resource depletion, pollution, overpopulation, and improper use of chemicals.

NOTE: All the sciences apply more sophisticated processes to improve knowledge and performance.

BUSINESS EDUCATION

MARKETING ELEMENT — the student learns that

the manufacturing and processing of goods affects the environment and so does the movement, maintenance and storage requirements since stock must be found in the right place and at the right time due to factors of seasonal production, seasonal demand, speculation, transportation, price, employment and government regulations.

world wide awareness of the resource crises will gradually have some impact on business and industry.

BUSINESS FOUNDATIONS ELEMENT — the student learns that

governments, management, consumer associations and individuals can affect the national economy and well-being through the conservation of goods, services and resources.

COMPUTING SCIENCE ELEMENT — the student learns that

the field of computer technology is rapidly expanding and developing in our society and its ability to deal with large amounts of data and information can help with decision-making about sensitive issues.

AUTOMOTIVES 32 ELEMENT — the student will

describe the methods that manufacturers are employing to achieve better fuel economy

RELATED MECHANICS ELEMENT — the student will

understand that the internal combustion engine is one of the major contributors to the pollution of the atmosphere

understand that a maintenance schedule associated with the proper parts is necessary to achieve peak performance and minimize undesired pollution

DRAFTING 32 ELEMENT — the student will

understand that the design of a structure presupposes the need to provide an environment consistent with the purpose of the building and the needs of the client and user

BUILDING CONSTRUCTION 32 ELEMENT

— the student will

learn that aesthetically pleasing finished appearances are created by attention to selection of design and materials

learn that a proper type of design and materials are used to combat the effects of environmental conditions such as weather and climate

learn that designers and builders must know the principles of insulation, vapour barriers, and ventilation for energy conservation and environmental comfort

SHEET METAL 32 ELEMENT — the student will

realize that within a commercial/industrial building a desirable atmosphere can be created through the use of air conditioning and heating systems

discuss the implications of solar heating systems, high efficiency furnaces and related units

PIPING 32 ELEMENT — the student will

periodically ask him/herself to what extent he/she is being academic — passive, active or theorizing — and to provide for a supplement between conventional types

AUTOBODY 32 ELEMENT — the student will

work in areas identifying and describing the inherent health and safety problems that exist in automotive painting

be aware of such safety hazards as explosions and chemical burns in the work place or work environment

VISUAL COMMUNICATIONS 32 ELEMENT

— the student will

understand the verbal and non-verbal techniques used by the mass media such as journalism

refine writing and reading skills to reflect accurate reporting and the recognition of bias or misleading information

demonstrate knowledge of creative illustration for a variety of purposes including reports, fiction and non-fiction books

become familiar with various styles of photography such as portraiture, fashion and industrial

People must become aware of the cost of retrieving material resources, not only in terms of money and effort, but in terms of waste and the disruption, degradation and destruction of the environment.

With the generation of thousands of bits of information on the environment and other topic areas, the computer has become a useful tool: → analyzing data and information, however, it may have both beneficial and harmful effects upon society.

Many alternative sources of energy can be considered but, at the same time, known and available sources should be conserved.

One recent development in law is the creation of a new branch of legal study and investigation, called environmental law, which is becoming defined at regional, national and international levels.

Humans are recognizing the need for and the value of initiating personal activities which will reduce the amount of energy and finite resources used.

The workplace to-be will be a part of an individual's environment. Comfort in and familiarity with an area and the people and equipment in it is important.

SKILLS, ABILITIES AND PROCESSES

The studies and activities engaged in lead logically to the learning and practice of SKILLS, ABILITIES and PROCESSES, such as:

applying the processes (observing, classifying, recording, formulating hypotheses, formulating models, predicting, inferring, experimenting and developing operational definitions) in laboratory and on site studies as a means of investigating human influence or impact upon the environment.

demonstrating the scientific method of organization in the solution of problems.

understanding the computer and its potential and role in society.

speaking and writing in the language of the computer.

becoming quite readily conversant with many facets and dimensions of industry to make decisions about employment.

calculating perimeter, area and volume of common geometric figures.

speaking and/or writing in a prepared presentation with appropriate language and style which provides a convincing argument and demonstrates the use of logical thought and organization as well as persuasive argument.

reading and listening critically in order to analyze the presented message and to differentiate between reality and truth of information as opposed to opinion or fiction.

communicating in a variety of styles and at a variety of levels consistent with anticipated needs.

utilizing the skills of conventional and photographic illustration in various media presentations such as a piece of photojournalism.

VALUES AND ATTITUDES

The studies and activities engaged in should lead to or contribute to the VALUES and ATTITUDES of the students, such as:

an awareness of these fundamental environmental concepts:
i) an interdependence exists between all living things and their environment,
ii) all components of the environment are in constant change;
iii) the biophysical environment is characterized by complexity and diversity, and
iv) all resources within the environment are in limited supply.

the field of computer technology is rapidly expanding and developing in our society and its ability to deal with large amounts of data and information can help with decision-making about sensitive issues.

the questions regarding noise, through its sources and causes as well as the potential problems of working conditions (radiation, eye damage, boredom) need to be addressed.

LAW ELEMENT — the student learns that

there is now a branch of law devoted to the care, keeping and control of the environment.

OFFICE PROCEDURES ELEMENT

— the student learns that

there is a need to become familiar with a number of work places and the equipment used there.

such things as travel arrangements require some knowledge of the environment through maps, travel and routes, etc.

ADDITIONAL ALTERNATIVES

VOCATIONAL EDUCATION and other possibilities could include:

FOOD PREPARATION 32 ELEMENT — the student will

exhibit the appropriate behaviour necessary for advancement in the field of food preparation in the hospitality/service industry.

become aware of the Canada Department of Agriculture Standards and Grades as they apply to food and food products.

HEALTH SERVICES 32 ELEMENT — the student will

understand that the human body changes during pregnancy and that obstetrics is the branch of medicine concerned with reproduction.

learn that there is a normal growth and development pattern for children and that pediatrics is the branch of medicine devoted to this area.

understand that the body can experience a number of problems, some of which may be in the person's environment, i.e., alcohol, drug, stress, disease.

understand that humans, like any living thing, live and grow, age and ultimately die, and special care may be required at any stage.

MATHEMATICS — the student

understands the role and place of the computer in our society and has some knowledge of its capabilities and limitations.

understands something of statistics including the concepts of sample and normal distribution, the calculation of mean, median and mode, and can relate statistics to probability.

can calculate the perimeter, area and volume of geometric figures common in everyday life.

LANGUAGE ARTS — the student

can present a convincing argument through logical thought and persuasive language.

become familiar with various styles of photography, such as portraiture, fashion and industrial

create and carry out a photojournalistic assignment

FINE ARTS

NOTE: The programs in Art, Drama and Music are in the process of upgrading and modification. Integrative possibilities will be identifiable

at all components of the environment are in constant change

and the biophysical environment is characterized by complexity and diversity, and

and all resources within the environment are in limited supply.

given the will and commitment to act positively toward the environment, man can go a long way toward correcting or alleviating environmental abuses.

people can and must act individually and collectively to maintain, protect, preserve and improve their environment

the many possible variety of value positions held by people and groups, made even more complex by the variety of cultural, economic, social and ideological factors and origins which are involved.

LANGUAGE ARTS — the student

can present a convincing argument through logical thought and persuasive language.

researches carefully and uses technical publications and more unique reference material in the preparation of a literary essay.

can assess the aura of reality created in visual messages, especially propaganda

is able to analyze and evaluate the extent to which manipulation devices are used in visual messages.

is aware of some of the variety, origins, conflicts and trends in human values and how these values may be expressed in literature.

PHYSICAL EDUCATION

NOTE: The Physical Education Program is in the process of upgrading and modification. Integrative possibilities will become evident

APPENDICES

These appendices are provided to give the reader additional information for the purpose of treating material not readily accommodated in the main body of this manual. The user will find:

APPENDIX A — Junior High School Courses

Within the junior high school certain courses are not grade specific. Courses such as industrial education, home economics and business education may be offered in a variety of patterns. For this reason only *samples* of content are displayed in the curriculum pages for Grades 7, 8 and 9.

APPENDIX B — Senior High School Courses

At the high school level, several course offerings may be taken by students at different grade levels, depending upon the nature of the school program or the selections of the students. In this section, courses numbered 10, 20 or 30 in the industrial education and home economics areas are treated for their environmental education reference.

APPENDIX C — Case Studies for Principals/Administrators

The value, utility and popularity of the case studies, which precede each grade section of this manual, have been strongly supported by the trial users. For this reason two additional studies are provided.

APPENDIX D — General Objectives for Environmental Education

The "global purpose" of environmental education is described in these objective statements.

APPENDIX E — Definitions of Terms Used in the Manual

For purpose of clarification the "working definitions" of the terms used — ability, attitude, concept, knowledge, objective, processes, skill, strand, theme, understanding and value — are provided.

APPENDIX F — Environmental Education and the Goals of Schooling and the Goals of Education

The importance of the statements accepted by Alberta Education as to the goals of schooling and the goals of education must be carefully noted. The manner in which environmental education is perceived to support those goals is described for the user.

APPENDIX G — Trial Teachers and Administrators

A large number of teachers and administrators from various areas and communities throughout the province graciously cooperated by examining and reacting to this manual and the companion catalogue. Their contributions have been very important to the development of these documents.

APPENDIX A
JUNIOR HIGH SCHOOL COURSES

INDUSTRIAL EDUCATION

SMALL ENGINES

- Explain why there is a need for conservation of fossil fuels. Page 26
- Explain some of the effects on the ecology, of the gases and wastes produced by the internal combustion engine. Page 26
- Explain the interrelationship of production, distribution and consumption elements of the small engines industry. Page 26

FLUID POWER

- Identify various forms of energy, such as solar, chemical, wind and light, and illustrate several ways in which each is used. Page 27
- Explain why there is a need for conservation of fossil fuels. Page 26
- Explain some of the effects on the ecology, of the gases and wastes produced by the internal combustion engine. Page 26
- Identify various forms of energy, such as solar, chemical, wind and light, and illustrate several ways in which each is used. Page 27
- Explain why there is a need for conservation and recycling of fluids. Page 28
- Explain some of the effects on the ecology, of the preparation and use of fluids in industry. Page 28

MECHANICAL POWER

- Explain why there is a need for conservation of mechanical energy. Page 31
- Explain some of the effects on the ecology, of the devices used to produce mechanical energy. Page 31

REACTION PROPULSION

- Design a model rocket with an appropriate recovery system, using design information supplied by the instructor. Page 33
- Explain why there is a need for conservation and recycling of materials used in reaction propulsion. Page 35
- Explain some of the effects on the ecology, of the materials used in the reaction propulsion industry. Page 35
- Explain briefly some of the hazards present when working with chemicals in the reaction propulsion industry or product development. Page 35

BASIC ELECTRICAL CIRCUITRY

- Identify and use chemicals that react on different materials to produce electrical energy. Page 40
- Explain why there is a need for conservation and recycling of materials used in the production of electricity. Page 43
- Explain some of the effects on the ecology, of the materials used in the production of electricity. Page 43
- Explain some of the hazards present when working with electrical components in industry or product development. Page 43

MAGNETISM

- Explain why there is a need for conservation and recycling of materials used in magnets. Page 44
- Explain some of the effects on the ecology, of the metals mining and manufacturing industry. Page 44

ELECTRONICS

- Review the regulations concerning the operation of transmission devices, such as walkie-talkies, citizen-band radios and ham radios. Page 53
- Explain why there is a need for conservation and recycling of electrical components. Page 55

COMPUTERS

- Make some projections concerning the use of the computer in our society during the next decade. Page 59
- Discuss some of the industrial applications of the computer for controlling machines such as lathes, milling machines and drill presses. Page 60

WOODS

- Identify the provinces that are major producers of forest products as raw materials. Page 68
- Describe the logging industry. Page 68
- Explain why there is a need for conservation and recycling of lumber. Page 70
- Explain some of the effects of the lumbering industry on the ecology. Page 71

METALS

- List the raw materials for some of the commonly used metals and identify on a map several areas in Canada where they are located. Page 75
- Explain briefly how the main raw materials are extracted by surface and underground mining. Page 75
- Explain why there is a need for conservation and recycling of metals. Page 79
- Explain some of the effects the metals mining and manufacturing industry has on the ecology. Page 79

LEATHER AND TEXTILES

- List the raw materials for leather and textiles and identify on a map several areas in Canada where they are located. Page 98
- Explain why there is a need for conservation of leather or textiles. Page 100
- Explain some of the effects on the ecology caused by harvesting the raw materials for leather or textiles. Page 100

PLASTICS

- List the raw materials for plastics and identify on a map several areas in Canada where they are located. Page 83
- Explain briefly how natural gas is extracted by drilling. Page 84
- Explain why there is a need for conservation of natural gas and coal. Page 86
- Explain some of the effects of the plastics industry on the ecology. Page 86
- Explain briefly some of the hazards present when working with plastics in industry or product development. Page 86

EARTHS

- List the raw materials for cement, concrete and ceramic materials and be able to locate on a map of Alberta some of the locations where the materials are extracted. Page 90
- Explain how the raw materials are extracted by surface and underground mining. Page 90
- Explain why there is a need for conservation and recycling materials used in the earths industry. Page 93
- Explain some of the damaging effects on the ecology caused by mining the raw materials for ceramics, cement and concrete. Page 93

PRINTING AND LITHOGRAPHY

- Use the printer's point system of measurement in product development. Page 108
- Prepare exact form of words, symbols or pictures using the available composition materials and equipment. Page 108
- Explain why there is a need for conservation and recycling of paper. Page 110
- Some of the effects of the paper manufacturing industry. Page 110

CAMERA AND DARKROOM

Explain why it is necessary to conserve some of the raw materials used in the camera manufacturing industry. Page 127

Explain why there is a need for conservation and recycling of photographic materials. Page 129

Explain some of the effects on the ecology, of the materials used in the photography processing industry. Page 129

Explain briefly some of the hazards present when working with photographic materials in industry or product development (and the difficulty of disposing of such materials). Page 129

INDUSTRIAL SIMULATION

Find ways in which man learned to use tools as an extension of his hands and later used simple tools to make more complex ones. Page 146

Note the development of specific crafts in various regions and the organization of trade groups such as guilds. Page 146

List inventions and accomplishments which made it possible for the change from hand work to machine work in factories. Page 146

Discuss how the need to produce more quickly and efficiently leads to automation. Page 146

Discuss that in a nationalized company all the people in the country or province own a portion of the company. Page 147

HOME ECONOMICS

LEVEL I

KNOWING ME — KNOWING YOU — the student

learns that a positive classroom climate (environment) is necessary to facilitate learning through exchange of ideas.

learns that individuality both in self and others is important to allow for more open relationships.

becomes aware of media as a potential source of opinion formation and biased ideas.

CHILD CARE I — the student

becomes familiar with safety hazards and safety and emergency procedures.

understands that the basic needs of a child include food, clothing, love, and a safe environment.

GROOMING — the student

becomes aware that the "body environment" requires personal grooming including hygiene and care of hair, hands, skin, teeth and clothing.

learns the importance of grooming, nutrition and exercise to physical well-being and self-confidence.

FOODS I — the student

understands the importance of safety and hygiene in food preparation.

is aware that a kitchen is an environment which, like any other, one should become familiar with.

ELECTIVE **PARTY FOODS** — the student

learns that sensory qualities affect food choices.

learns to plan and prepare for a social occasion which is, in fact, planning for a particular environment.

ELECTIVE **SIMPLE SNACKS and MEALS** — the student

learns that a person can achieve a degree of self-sufficiency in making snacks and simple meals. This requires the management of human and non-human resources.

SEWING I — the student

realizes that the tools and equipment to be used are part of the work environment.

ELECTIVE **CLOTHING I** — the student

learns that clothing is a part of the body's external environment.

learns that clothing frequently indicates the wearer's individuality or can define a role or job.

ELECTIVE **LEISURE CRAFTS** — the student

learns that leisure time can be utilized constructively.

learns that the selection of a hobby or leisure craft will be on the basis of interest or coordination and skill.

LEVEL II

RELATIONSHIPS — the student

learns that the variety of needs may be satisfied, in part, by establishing relationships with others.

learns that behavior within situations in the personal environment can be practised through the use of case studies.

recognizes that although members of a group have many things in common, each is unique in growth, thinking and behavior.

CHILD CARE II — the student

is able to identify the needs of young children and the resources to meet these needs.

PHYSICAL WELL-BEING — the student

understands some of the health hazards within the environment.

FOODS II — the student

understands that lifestyle and economics are factors which influence food choices.

learns more about the need for safety and hygiene in the kitchen.

PIONEER FOOD AND OUTDOOR COOKING — the student

is able to prepare and compare the food products of the past and the present.

understands some of the special techniques needed in outdoor cookery.

ELECTIVE **FAST FOODS** — the student

is aware that time, money and human energy can be saved through simple management and food processing techniques.

is aware of the nutritional risks taken in eating fast foods in their outlets.

SEWING II — the student

is able to understand the properties of various fabrics and the way these would be selected for various uses.

CLOTHING II — the student

learns that clothing can create impressions and affect feelings.

ELECTIVE **SPORTS GEAR** — the student

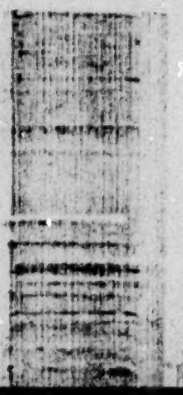
is able to identify functional clothing for particular sporting activities.

LEVEL III

FOODS III — the student

learns that nutrients come from various sources and have many functions for the body's internal environment.

understands that a balance between food intake and energy expenditure is required.



CHALLENGES AND DECISIONS — the student

understands that within a person's personal environment, decisions, events and situations arise which force adjustments or changes.

ELECTIVE **MAKING MEALS** — the student

learns that a successful meal involves considering nutrition, aesthetics, socialization, management, preparation skills and food choices.

ELECTIVE **CLOTHING III** — the student

learns that a basic wardrobe selection should be based on one's activities and resources in the personal environment.

ELECTIVE **CULTURAL FOODS** — the student

learns that by sampling and identifying cultural foods it is possible to learn something of other peoples and their traditions.

understands that cultures are affected by the environments in which they exist.

ELECTIVE **SEWING FOR HOMES** — the student

learns that it is possible to improve the appearance (aesthetics) of the surroundings (environment) through some personal energy and skill.

learns the importance of conservation now and in the future.

MANAGEMENT OF RESOURCES — the student

recognizes that different forms or combinations of available resources may be used for the meeting of needs and achievement of goals.

becomes aware of the human and non-human resources which may be available.

recognizes the influences which affect decision-making, such as advertising and peer pressure.

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FAMILIES — the student

understands that there are many groups of people who interact with individuals as a part of the human environment; the family is one such group.

learns that family structures change with the passage of time, and that family crises may arise.

BUSINESS EDUCATION "A" OPTIONS

LAW FOR YOUNG CITIZENS — the student will

find out about the various sources of legal aid to the juvenile which would include legal, social and counselling agencies.

be aware of the various agencies which are involved in distributing aid, sharing information and assisting those in need.

MICROCOMPUTERS — the student will

learn how to operate a microcomputer; learn its uses and limitations, and understand its influence on our daily lives.

THE BUSINESS WORLD — the student will

be able to define the purpose of a business and to develop an awareness of the various aspects of the community.

become aware that each person is a consumer of goods and services.

be aware that there are a variety of career opportunities in businesses.

COMMUNICATIONS — the student will

be introduced to the many other forms of communication such as conventions, trade fairs, meetings, seminars and face-to-face communications.

become aware of the modes of telecommunications, such as teletype, electronic mail, television, telegram, cablegram, telidon and satellite transmission.

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APPENDIX B
SENIOR HIGH SCHOOL COURSES

INDUSTRIAL EDUCATION

MATERIALS 10-20-30 ELEMENT — the student will

- understand that raw materials must be taken from the environment and processed for use in the production of goods and materials.
- identify the sources of some of the more common wood materials.
- discuss the lumber industry and its processing of wood products in Alberta, Canada and the rest of the world.
- learn that products manufactured from wood must have their surfaces protected from the environment.
- understand the importance of safety procedures within the work environment.
- learn that the types, styles and sizes of structures will be influenced by such environmental factors as climate, weather, soil conditions, insects, altitude, etc.
- understand the special construction requirements for heating, cooling, insulating, fireproofing, soundproofing and lighting buildings of various kinds.
- learn that metals are extracted from the earth by surface or underground mining and that these procedures may be damaging to the environment.
- learn that the surfaces of many metal objects and products must be protected from the environment.
- learn that plastics are derived from petroleum.
- learn that there are both natural and synthetic (man-made) fabrics.

VISUAL COMMUNICATION 10-20-30 ELEMENT — the student will

- understand that the practice of safety is essential in all activities in the laboratory or the work environment.
- be aware that the disposal of chemicals, such as those used in photography, may be dangerous to the environment.
- understand that the use of colour has a psychological effect upon the consumer — colour in the environment affects people.
- learn that geographic data about the environment is recorded in air photographs and/or various types of scale maps and charts.
- learn that geographic data about the environment is recorded in air photographs and/or various types of scale maps and charts.
- learn that plot plans for buildings must consider physical and cultural features and local by-laws.

POWER TECHNOLOGY 10-20-30 ELEMENT — the student will

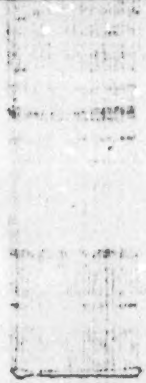
- understand that proper attention to safety procedures is essential in all activities carried on in the laboratory or work environment.
- be aware that concern about the supply of oil has fueled the investigation of alternate energy sources such as solar, wind, water, propane, electrical, etc.
- understand that an automobile owner/operator has the responsibility of maintaining the vehicle in a safe operating condition.

DRIVER AND TRAFFIC SAFETY EDUCATION 10 — the student will

- be aware of the manner in which the automobile has revolutionized society, especially in North America.
- understand the laws which are to protect the driver and others.
- be aware that there are essential maintenance needs to make a vehicle mechanically and ecologically safe.
- understand that there are a number of environmental conditions which can be hazardous to driving.

ELECTRICITY-ELECTRONICS 10-20-30 ELEMENT — the student will

- discuss codes and safety procedures as they may apply to electricity and electronics in the laboratory or work environment.
- learn that electrical and electronic devices require replacement parts and periodic repair.
- learn that home safety devices for electrical wiring etc., include fuses, circuit breakers and automatic shut-offs.
- understand that the computer allows people to analyze information to make predictions and decisions including those which may affect the environment.
- learn that radio and television communication has served to "shrink" the world, bringing information about the environment and happenings within it to immediate attention.



HOME ECONOMICS

PERSONAL LIVING SKILLS 10-20-30 ELEMENT — the student will

- realize that one's personal environment is affected by one's individual self-concept which is formed and adapted by values and goals, philosophy of life and lifestyles.
- understand that individuals are affected in many ways by the many components of their environment including family, friends, the community, the world of work, etc., and these resource factors must be controlled and/or managed.
- understand that roles and relationships change over time.
- understand that lifestyles and "socially acceptable" behaviours may be different with each new generation.
- become aware that the selection and design of the near environment (home) can enhance the quality of life.
- understand that home designs and home furnishings may be influenced by historical, cultural social and physiological factors.
- be aware that a variety of housing forms are found — this variety and the choices will be based on preference, cost trends, availability of materials, energy and conservation demands, etc.
- understand that the life skills and family activities of the past may lead to satisfying leisure time activities and to the preservation of elements of our culture.
- understand that the family may be exposed to various crises including natural disasters (floods, storms, etc.), technical disasters (blackouts, explosions, etc.), and social upheaval (war, riot, etc.).
- perhaps participate in field trips to various locations to learn more "first-hand" about personal living skills topics.

APPENDIX C

CASE STUDY

ELEMENTARY SCHOOL ADMINISTRATOR

The elementary school is usually described as a structure of indeterminate size (anywhere from one to thirty rooms) serving the instructional needs of children from Grade One to Grade Six. It is usually staffed by teachers who instruct in all, or nearly all, subject areas. Although class sizes vary there are seldom more than thirty students in a group.

Some schools have a number of supplementary teaching spaces such as a gymnasium, library or music room. Many schools have, in addition to 'regular' classes, students in Early Childhood Services groups or 'special' children in programs for the gifted or handicapped in the region.

Interdisciplinary instructional strategies are quite possible since strong specialization at the elementary level is not common. The teacher is normally conversant with the content of the variety of subjects to be taught. The individual grade pages are designed to show teachers one way of looking at and diagramming one possible approach.

This case study for the administrator offers a description of how one school was able to look at integrated instruction and interdisciplinary planning to include special circumstances in a school.

CASE STUDY

ELEMENTARY SCHOOL ADMINISTRATOR

Setting

Direction Elementary School is one of many in Alberta which, in addition to conventional classes, houses groups of students described as handicapped. Located in a major urban centre, the school has seventeen rooms, three of which are designated for the twenty-four students in the E.M.H. (Educable Mentally Handicapped) classes.

Principal, Ivan I. Deere, has been wrestling with statements found in the *E.M.H. Curriculum Guide — Alberta Education 1982*. The introduction to that document says:

> Just as there are countless individual characteristics in regular students, such differences are equally apparent among students who are mentally handicapped. Present educational opinion suggests that the 'special' student should be provided with an education experience similar, as far as possible, to that of the 'regular' student. Schools, however, must not limit themselves to provision of an academic program only; instead, a commitment must be made to provide a much broader program which will lead ultimately to the fulfillment of the broader educational goal. The development of a student who is mentally handicapped must be reviewed individually in terms of intellectual potential, home and school experiences, social and psychological factors. (p. 2.)

The guide suggests further:

> Because of the diverse nature of school settings in which classes for students with mental handicaps are located, it is impossible and inadvisable to suggest one particular setting over another. It is recommended, however, that wherever possible, students with mental handicaps be integrated into a regular classroom setting. It is imperative that this policy be enacted only after a careful assessment of the student's needs and of the regular classroom setting. (pp. 2-3.)

At the same time Mr. Deere examined the new *Environmental Education Manual for Grades I to XII* and found the statement:

> Alberta Education firmly believes that environmental education activities have an important place in all special education programs, whether delivered in a special class or in a regular class setting. In addition to the environmental education sections found in the special education curricula, teachers of handicapped pupils are encouraged to select and modify any of the content and ideas found in the manual or in the companion document, *Catalogue of Resources for Environmental Education: Grades I to XII*.

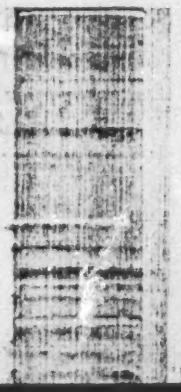
Ivan and the three special education teachers, Uwila Cope, Joy Fuller and Isobella Helpa, are anxious to meet these expectations and have decided that the most appropriate classes to blend with would be the Grade Five and Six groups in the school. The chronological age and physical size match of the students was closest at this level.

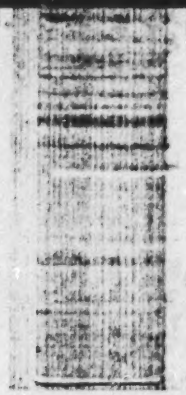
One aspect requiring consideration was the fact that the 'regular' classes had already been accepted as a part of the short environmental education residence program offered at the Urban Environmental Studies Centre. Ideally, it was felt, the 'special' students should, somehow, be included, if they could benefit from the experience.

Planning — Part One

The system's Central Office provides an assigned project teacher. Robyn Byrd, a specialist in outdoor education, is available to assist principals and staffs in planning and preparing program alternatives. Mr. Deere felt that one of the most effective ways of utilizing the specialist's services would be through a system of parallel planning involving separate study and examination of both the manual and the guide by two teams or groups with himself acting as a type of intermediary.

The three teachers of the special classes would form a committee to identify relevant objectives for their classes gleaned from the *Educable Mentally Handicapped Curriculum Guide* with particular attention paid to the living and vocational skills dimension. At the same time, Ivan, the specialist Robyn Byrd and two of the teachers from the regular Grade Five and Six classes, would seek out appropriate objectives from the *Environmental Education Manual for Grades I to XII*. Ivan felt that the integrative nature of the manual would be consistent with the special education approach since pages 8 and 9 of that guide clearly focus on "the integrated curriculum". The two patterns of objectives would be examined together and some sort of





interface would be attempted.

The day-trip plan had to take into account some problems of logistics. Since travel to and from the area selected for the study, Shark Stream Provincial Park, was to be accomplished by the normal transit service, the bus company had to be informed. The timing of travel had to fit with other bus service since most of the E.M.H. students came to Direction Elementary School from outside the school's normal district. Mr. Deere took it upon himself to deal with this scheduling problem as well as seeing to the necessary central office approval and insurance coverage. He and Robyn Byrd were also able to contact the warden of the Shark Stream Provincial Park and arranged to have the assistance of the park naturalist for part of the program.

Planning — Part Two

The two committees met under the chairmanship of Mr. Deere to see just how their independent objectives might blend. Each group was pleasantly surprised at the ease with which their ideas came together. In fact, they were soon able to put together a "two-stream" plan whereby selected activities could be identified to satisfy "pairs" of objectives. Part of the resulting plan is shown in the accompanying chart. Certain brief codes and page numbers were included to help the planners refer to the parent documents easily. For example, 5 - K and U stood for Grade Five, Knowledge and Understandings.

Conclusion

The project went ahead as planned and proved to be a great success. The E.M.H. students reacted well and their teachers were pleased with how much they were able to achieve. Robyn Byrd, the park naturalist and Ivan Deere were equally impressed and the staff of Shark Stream Provincial Park sent a note of appreciation to the school.

Follow-Up

Ivan I. Deere was part of an informal study group of school principals whose schools had special classes within them. The integrations of these students into the mainstream operations of a school, while highly desirable, is not always easily or readily accomplished.

After the Shark Stream activity was completed Ivan met with the participating staff to evaluate and discuss some of the results and to note their observations. A number of experiments in some of the schools attempting outdoor and environmental education for special students had revealed some interesting situations and conditions. Mr. Deere wanted to know whether any of these might also apply to Direction School. He wanted to avoid problems that might be caused by:

a) the tendency of the parents and the teachers of certain special class students to become somewhat over-protective of their children.
b) the tendency of some teachers to gradually lose perspective and, on occasion, to attach greater merit to student performance than might be the case if that performance was measured against a different scale.
c) the tendency of students in 'normal' classes to try to be helpful to their 'special' integrated classmates, a tendency more frequently noted than were teasing and avoidance.
d) the lack of really useful research data and information on special education students in outdoor or environmental education particularly in the area of skill development and measurement.

To their credit the teachers were prepared to admit that potential problems might exist. They insisted, however, that with careful planning, good communication and public relations with school parents, and plenty of staff cooperation integrative activities with regular classes were realistically possible. They accepted the motto proposed by their principal. For Direction School it would be "Stretch Our Students".

E.M.H. GUIDE OBJECTIVES The student —	SELECTED ACTIVITIES	E.E. MANUAL OBJECTIVES The student —
– visits a local recreation facility (p. 121) – practises socially acceptable behaviour (p. 111) – demonstrates increased understanding of the dangers associated with different recreation areas (p. 87) – practises safety rules in each recreational area (p. 87)	– Go on a field study trip to Shark Stream Provincial Park	– learns that there is an aesthetic beauty in the natural environment and that some of this may be preserved by setting aside areas to be left in a wilderness or near-wilderness state (V - K and U) – shows capability in planning for and behaving appropriately during a more extended out-of-school study. (V - S.A. and P)
– assumes leader roles: – in the classroom – on the playground – with peers in structured situations (p. 76) – demonstrates initial recognition that roles may involve rights and privileges, duties and responsibilities (p. 76)	– Help organize and run a bake sale to raise money for bus and lunches	– demonstrating improved social and coping skills (V - S.A. and P) – group decision, resulting in some "future plan" may be beneficial to the individual and the group (VI - K and U)
– knows the advantages and disadvantages of various modes of travel: eg. bus (p. 79) – recognizes landmarks in wider community and uses simple maps. (p. 79)	**Schedule** **10:00 - 10:30 A.M.** – Trip to the park using public buses – Make and follow simple maps and routes	– with the recognition that resources in the environment are in limited supply must come an understanding that it is necessary to reserve, preserve and conserve wherever possible (V -Theme) – handling a reasonable orienteering problem (V - S.A. and P)
– demonstrates relaxation, concentration and trust of self and others (p. 117) – identifies environmental stimuli to the senses (p. 117)	**10:30 - 11:30 A.M.** – Blind walk in pairs – Walk through park areas with park naturalist	– living things survive when they adapt to changes in their environment. (V -Science) – there is an aesthetic beauty to be found in the environment. (V -Science)
– demonstrates awareness of a variety of environmental considerations (p. 125) – assumes responsibility for own behaviour (p. 119)	**Lunch Break** – Clean up garbage – Tidy eating area	– personal surroundings (environments) can be examined and altered or improved. (VI - K and U) – understanding and demonstrating skills of outdoor living that are sensitive to the environment. (VI - S.A. and P)
– arranges and fastens string/yarn, for example, on to flat materials (p. 112) – engages in activities based on interests and abilities: like crafts (p. 118)	– Collect string, pebbles, dead grass and leaves to make a picture or collage – Rubbings of leaves and tree bark	– recording information and impressions about the environment in various art forms (V - S.A. and P)
– developing improved motor skill through activities (V - S.A. and P) – understanding physical limits and fatigue (VI - S.A. and P)	**1:15 - 2:00 P.M.** – Group games, races and obstacle races	– demonstrates a variety of movement combinations (p. 102) – participates in many activities (p. 110)
	2:00 - 2:30 P.M. Return by bus to school	

CASE STUDY

SECONDARY SCHOOL ADMINISTRATOR

The situation in a secondary school is considerably different from that generally found in an elementary school. Whereas an elementary teacher frequently offers most, if not all, the "courses" presented at that level, the secondary teacher is, of necessity, more of a specialist who instructs in a reduced number of areas in greater depth.

Due to the expertise and mastery required in the areas of specialty, the secondary teacher may not have the time or desire to become knowledgeable about the objectives or content of other subjects being taught in the same school or grade. The large number and variety of students faced will further occupy most of the teacher's available time.

These conditions may, at least at first glance, make cooperative or interdisciplinary planning and teaching difficult to achieve. Only in those situations where administration and staff are receptive to such an approach and where it blends with the school's established priorities should it be attempted. Where the 'climate' is conducive to such an approach it appears worthy of consideration.

CASE STUDY

SECONDARY SCHOOL ADMINISTRATOR

Setting

Mr. Hyer Lerning is principal of a large centralized high school in the province of Alberta. The forty-one teachers he has on his staff make it possible for the school to offer a wide variety of courses in both the academic and vocational areas.

The school is located near, but not in, a major urban center. Students are bused in from a number of surrounding communities. The staff, too, come from different areas with many commuting to work daily from a considerable distance. Large numbers of after-school meetings are not very popular with either the staff or the student body.

Mr. Lerning is anxious to bring in a program of environmental education and would like to have the interdisciplinary possibilities of such a course stressed as much as possible. He realizes, however, that certain approaches to course development could be nearly impossible due to the school's structure and organization and the conditions resulting from the "commuter" nature of the school.

Planning — Part One

Mr. Lerning examined the *Environmental Education Manual* section for Grade Ten and quickly became aware of the large number of environmental concepts which could be dealt with at the Grade Ten level. Ideally, the teachers could cooperate in a variety of ways in order to structure a program. As he listed the possibilities, he tried to consider the benefits and the constraints of each of several alternative possibilities.

Alternative One

All the staff would be asked to stress environmental education through their own teaching of their particular discipline. **Plus Points** — (a) All teachers would be involved. (b) All students would be exposed to environmental education to some degree. (c) No special or new demands would be placed on staff or students. **Minus Points** — (a) No student took all subjects so no student would get a 'total' picture. (b) No interdisciplinary approach could be made.

Alternative Two

One teacher would be appointed as the environmental education instructor and all students would be registered in such a class. **Plus Points** — (a) All students would get the same exposure to environmental education. (b) One teacher could select the approach and content thus assuring an interdisciplinary stress. **Minus Points** — (a) A near-impossible teaching load would be put on a teacher. (b) As a "new" subject it would create a large timetabling "headache". (c) If content were selected from many subjects, duplicate teaching could result.

Alternative Three

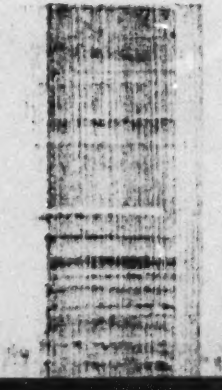
Two teachers, one from the academic and one from the vocation areas, would be identified as environmental education instructors. **Plus Points** — Same as in Alternative Two. **Minus Points** — Only slightly improved over those stated in Alternative Two.

Alternative Four

Massive team teaching would take place whereby teachers would function as "guest lecturers" in other classes in order to bring new information from their particular perspective to the students. This might be particularly valuable when exchanges take place between vocational and academic areas. **Plus Points** — (a) Students would get a more balanced and interdisciplinary program. (b) All teachers would be involved. **Minus Points** — (a) Enormously time consuming, requiring many meetings and many extra lectures. (b) Very difficult to schedule. (c) A danger of some lectures not being suited to the level of the listeners. (d) Potentially wasteful and difficult to evaluate.

Alternative Five

Theme teaching focussing upon three theme days a year. Mr. Hyer Lerning noted the six themes recommended for focus at the Grade Ten level. He felt that one way of reaching most of the students and getting at least some of them personally involved would be to have the various classes, where appropriate, offer presentations and displays on the themes. Day one would combine energy with technology and industrialization. Day two would include conservation and pollution. Day three would blend adaption with interactions and interrelationships. **Plus Points** — (a) This would be easy to schedule. (b) At one time or another all students and staff would be involved. (c) All perspectives and subjects would be served. (d) It would be visible and easy to evaluate. (e) It could be expanded to include parents' night or school fair foci. **Minus Points** — (a) Three days of lost time could be charged but the time was not really lost. (b) Some scheduling and organization problems.



Themes

1. The control and utilization of **ENERGY** has contributed to the growth and advancement of civilization. It has, however, led to problems of scarcity and other significant social and environmental questions.
2. **TECHNOLOGY** and **INDUSTRIALIZATION** have been instrumental in providing products and materials to meet the needs and wants of people. A social question should explore the difference between needs and wants.
3. The **CONSERVATION** of resources and energy is essential due to the recognition of the fact that these are in limited supply. A system of the "FOUR Rs" needs to be established – Reduce, Reuse, Recycle and Replenish wherever possible.
4. The **POLLUTION** of the environment has reached dangerous proportions. Individually and collectively people can and must act to solve or alleviate this problem.
5. The **ADAPTATION** of living things to their environment is essential to their survival. This is not the same as attempting to change the environment in order to meet perceived needs.
6. The **INTERACTIONS** and **INTERRELATIONSHIPS** which exist between components of the environment and between peoples are similar in that a state of interdependence exists. The diversity and complexity of the components is such that any significant change in one element often results in some noted change in other elements or in the whole of the environment.

At the school's staff meeting Hyer presented his case to the teachers and discussed the possible alternatives for achieving some viable program goal. The staff, after some debate, opted for **Alternative Five.**

Planning — Part Two

In planning for the direction to be taken for the "First Environmental Day" the staff together looked at the *Environmental Education Manual* with one group examining the Grade Ten section. Hyer knew that other groups could develop ideas from the Grade Eleven and Grade Twelve sections.

The staff selected the **Objectives,** from **Knowledge and Understandings,** as:

- *The need for resources and materials from the environment may result in inter-regional disagreement and conflict which, in turn, may impact upon unity within nations and foreign policies among nations.*
- *Research, technology and industry have accelerated the use of the resources and materials which provide the energy and products utilized by society and, since these resources and materials are in limited supply, a number of conservation strategies must be pursued.*
- *The environment is in constant change through natural causes and man has inflicted himself in such a way as to cause additional changes, through industrial pollution, for example.*

By tracing the lines and arrows from these selected objectives it was possible to determine which subject areas and classes would contribute to the first display day. The **Subject Strands** were:

Social Studies

- *Topic B — "Canadian Unity";*
- *Topic C — "Canada and the World"; and*
- *Elective C — "Crisis Canada".*

Science

- *Chemistry Element: Core Material as well as the Electives — "Chemicals in the Environment" and "Chemicals in the Marketplace".*

Health

- *In a community there are a number of health care service organizations of a public or private origin. These are often made possible through volunteer assistance. Many of these organizations are formed to react to crises of one kind or another.*

Beauty Culture

- *In cosmetology (chemistry) the student learns about the need to dispose safely of non-degradable materials and chemicals and collects pictures to reinforce understanding of the responsible and irresponsible use of natural resources.*

Personal Living Skills

- *There is a need for resource management if one is to identify and select values, goals, and standards and achieve them.*
- *On occasion, the family-in-crisis situations may arise. Preparations should be made in the event a natural or man-made crisis such as blackout, flood, fire, earthquake or snowstorm, should occur.*

The staff felt that these foci would lend themselves to a stress and application of certain specific **Skills, Abilities and Processes,** such as:

- *solving problems involving data interpretation, statistics and mathematic equations;*
- *recording information in a variety of ways including pictorial, graphic, recorded and written;*
- *writing carefully researched papers expressing convincing arguments;*
- *interpreting and presenting messages pictorially and in design form with an understanding of colour, style and impact.*

These were easily traced to their contributing subject strands which made for obvious involvement by:

Mathematics

- *learns to organize and treat data by: grouping according to type and class; determining the frequency and definition of the class; graphing; calculating mean and mode;*
- *can supply mathematics in grid studies of the environment such as latitude and longitude, city and townsite plans, or oilfield layouts.*

Language Arts

- *uses various methods of development such as reasons, examples, descriptive details and illustrations;*
- *can identify and limit a topic and select material appropriate to the subject, purpose and audience;*
- *writes a convincing argument in support of a clearly defined position;*
- *locates required information using a variety of standard sources;*
- *understands that a visual message is affected by colour, angle and movement.*

Visual Communications 12

- *practises image creation through expressive drawing and interpretation using a variety of media and techniques including outdoor sketching, landscapes, plant forms and other subject matter from the natural and man-made environments.*

Drafting 12

- *understands that the drafter will usually express and interpret dimensions of the environment, or what may be added to the environment in some way, through sketches and drawings.*

and Building Construction 12

- *applies mathematic skills and drawings and sketching to this world of work.*

Planning — Part Three

Mr. Hyer Lerning recognized that both staff and students would require some additional

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resources in order to prepare adequately for the first "Environment Day". He also knew that he should do something to involve himself in the project as well. His resource search included information and ideas provided in the *Environmental Education Resources Catalogue*:

1. He selected, from the library and the Language Arts Department
   – the book, *Earthwalk* by Philip Slater
   – the book, *Lifeboat* by Ken Hewitt
   – the book, *From Nature to Me* by Bruce L. Barrett and John N. Stratton, and
   – the book, *The Environment and You* by Matthew J. Brennan.
2. He contacted the Alberta Energy and Natural Resources Department to obtain its most current documents and arranged for a visit from the **Energy Van**.
3. He contacted several **local industries** to arrange visits.
4. He wrote to the Minnesota Department of Education to obtain its **Portfolio of Energy Ideas** in science and social studies.
5. He purchased such items as additional art and poster supplies, Polaroid cameras and film.
6. He arranged for the availability of National Film Board and other **appropriate films** for the school.

Evaluation

The first Environment Day on Energy, Technology and Industry was a huge success.

APPENDIX D

GENERAL OBJECTIVES FOR ENVIRONMENTAL EDUCATION

The general objectives for environmental education are deemed to include:

A. **Awareness** — to help individuals and groups acquire an awareness of and sensitivity to the total environment and its associated conditions and problems.

B. **Knowledge** — to help individuals and groups acquire basic understanding of the total environment, its associated conditions and problems and humanity's critically responsible role in it, and further, to help individuals and groups acquire the necessary knowledge base from which to examine and assess the worth and/or implications of new developments, information or proposals.

C. **Attitude** — to help individuals and groups acquire and develop social values, strong feelings of concern for the environment and the motivation for actively participating in its careful utilization, maintenance, protection and improvement in a manner appropriate to the identified situation or condition.

D. **Skills** — to help individuals and groups acquire the skills necessary for examining, assessing and, hopefully, solving problems of and within the environment.

E. **Evaluation Ability** — to help individuals and groups evaluate environmental measures, programs and strategies, etc., in terms of ecological, political, social, economic and aesthetic factors.

F. **Participation** — to help individuals and groups develop a sense of responsibility and commitment regarding the environment and its associated problems to ensure appropriate action, both individual and collective.

APPENDIX E

DEFINITION OF TERMS

The following terms are used throughout the manual and are defined for the user:

1. **Ability** — the physical, mental or legal capacity to perform.
2. **Attitude** — behaviour representing a feeling or conviction.
3. **Concept** — a general or abstract idea or notion.
4. **Knowledge** — knowing something with a considerable degree of familiarity gained through experience, or a contact or association with the individual or thing so known.
5. **Objective** — something toward which effort is directed; an aim or an end of action.
6. **Processes** — the activities that scientists exhibit in their research or problem-solving behaviour. These include: observing; classifying; quantifying; communicating; inferring; predicting; formulating; defining terms; controlling variables; interpreting data; formulating models; experimenting, processing data; identifying problems; seeking more evidence; and applying discovered knowledge.
7. **Skill** — dexterity or fluency with or the knowledge of a means or method of accomplishing a task.
8. **Strand** — an element of a woven or plaited material.
9. **Theme** — an idea, an ideal or an orienting principle that is dominant or persistent in controlling or activating conduct in a specific direction.
10. **Understanding** — (the noun form) — the grasp of meaning; the capacity to interpret or explain something to oneself.
11. **Value** — relative worth, utility or importance; that which is rated highly; status in a scale of preference.

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APPENDIX F

ENVIRONMENTAL EDUCATION AND THE GOALS OF SCHOOLING

A properly designed program of environmental education will contribute effectively toward the achievement of the goals of schooling. For example:

- the development of competencies and the development of learning skills for the acquisition and treatment of information are goals consistent with those described for environmental education. Indeed, the address of real, relevant and meaningful problems and conditions frequently motivates the learner toward higher achievement;
- the application of knowledge to important real life situations is a fundamental of environmental education. Further, the environment, with its many dimensions and facets, is of concern locally, nationally and internationally;
- active citizenship and its responsibilities and benefits are essential ingredients in the participation objective stated for environmental education; and
- the out-of-school study component of a program of environmental education has the potential advantage of motivating those individuals who find the institutional setting unsuitable. One of the educator's responsibilities is to seek out the most appropriate and effective arena for instruction. Additionally, preparation for the world of work may be facilitated and enhanced when the learner has the opportunity to explore a variety of study and work environments.

ENVIRONMENTAL EDUCATION AND THE GOALS OF EDUCATION

Environmental education applies itself to virtually all of the stated goals of education. Of particular note are those which refer to:

- a sense of community responsibility which embraces respect for law, authority and the rights of others;
- an interest in cultural and recreational pursuits; and
- a commitment to the careful use of natural resources and to the preservation and improvement of the physical environment.

APPENDIX G

TRIAL TEACHERS AND ADMINISTRATORS

The teachers and administrators listed below were examiners in the trial period for the *Environmental Education Manual For Grades I to XII* and the *Environmental Education Catalogue of Resources For Grades I to XII*.

Calgary Roman Catholic Separate School District #1
M. Alain, R. J. Bechard, P. Dvorack, M. Gay, R. Hack, J. Hazelzet, E. Lakusta, R. Lengsfeld, K. A. MacAulay, A. McGinn, J. McKay, T. V. McPhail, P. Schumacher, M. J. Tomcala, L. Whitaker, G. Williams

Edmonton School District #7
D. Barge, F. Elliott, B. Galbraith, T. Giroux, N. Jacobson, R. Kay, W. Lepatski, P. Skett, J. Torsky, H. Willekes

Foothills School Division #38
K. R. Eastlick, D. Green

High Prairie School Division #48
D. Doucet, A. A. Lehman

Lethbridge School District #51
H. Boer, E. Henderson

Northland School Division #51
B. Ellis, J. Fetterly, R. Hyde, J. M. Newman, A. K. Spencer, I. Wetherell

Rocky View School Division #41
W. Bell, M. Reikie, M. Taylor, D. Thomas

Two Hills (County) #21
L. Basaraba, D. Dochuk, S. Horon

Wheatland (County) #16
J. Cammaert, P. Conley, E. Holt